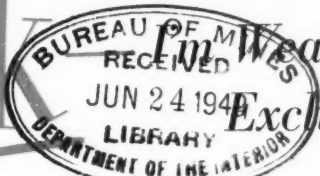


# BUTANE-PROPANE

HEADQUARTERS FOR LP-G  
INFORMATION SINCE 195

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Library Rm 2228 Int Bldg  
18 & 19th Sts NW  
Washington 25 D C 20548

# Look



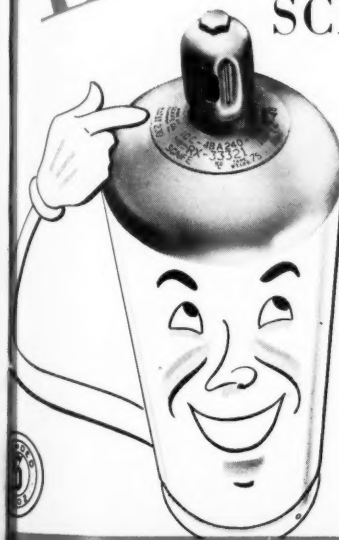
*I'm Wearing the  
Exclusive*

## SCAIFE INFO-CROWN

(TELLS ALL YOU WANT TO KNOW  
ABOUT ME)

**SCAIFE**  
LIGHTWEIGHT CHAMPION  
**CYLINDERS**

The exclusive Scaife INFO-CROWN clearly and deeply imprinted gives ICC data, serial number, tare weight and the other information you need, in large, easy-to-read letters.



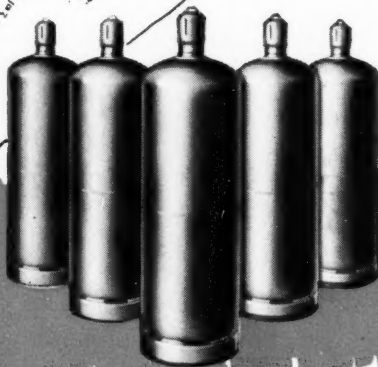
## SCAIFE COMPANY

Oakmont (Pittsburgh District), Pa.

Founded 1802



ever figure how **LIGHT WEIGHT**  
saves you money?



## **Hackney RC-100A is LIGHT in WEIGHT . . . thanks to Research and HIGH-STRENGTH STEELS**

**High-Strength Steels!** That's what makes the Hackney RC-100A\* the leading cylinder in the field. It weighs approximately 70 lbs.—yet has the rigidity and strength to withstand handling and transportation abuse.

Think what this reduction in tare weight does to your costs. The Hackney RC-100A

is handled easier and faster. It saves money in shipping charges. It means less wear and tear on trucks . . . assures bigger truck loads of cylinders. And you make the savings not once—but hundreds of times throughout the long lives of Hackney High Strength Steel, Lightweight Cylinders.

### **AND CONSTRUCTION FEATURES DESIGNED TO LOWER YOUR COSTS**

The RC-100A assures lower maintenance costs. The "scalloped" foot ring permits thorough inspection and easy cleaning. The finishing procedure pro-

vides a better bond between paint and metal. Identification of Hackney Cylinders is fast and easy—thanks to the depth-controlled legible stamping.

*Write for full details on these high-strength steel, lightweight cylinders.*

*\*Model RC 100A—Hackney removable cap type cylinder 100 lbs. propane capacity (alloy).*



## **Pressed Steel Tank Company**

**Manufacturers of Hackney Products**

**Main Office and Plants: 1487 S. 66th St., Milwaukee 14, Wis.**

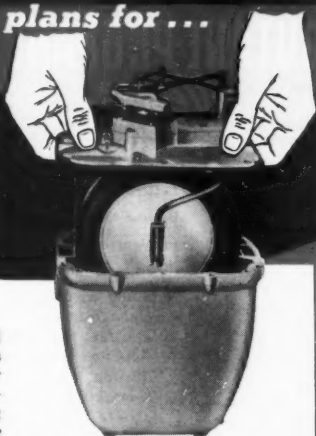
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227 Hanna Bldg., Cleveland 15, Ohio**

**208 S. La Salle St., Room 2069, Chicago 4, Ill.  
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economical factory service plans for ...

# ROCKWELL-EMCO

## No. 00 LP-Gas Meters



### An Exclusive Convenience

There's no need to shy away from metering because of anticipated repair difficulties. We've streamlined that procedure for LP-gas meters with the six repair plans listed below. Here's just another way we help our customers get the most out of their meters—another good reason for checking all the advantages of using Rockwell-Emco No. 00 LP-gas meters on your services. Write for bulletin 1163.



Illustrating how entire measuring mechanism (valve plate assembly) lifts from meter case. This can be returned to factory to be serviced or it may be replaced with a completely new unit in your own shop. Choice of six repair plans described below.

#### WHEN ENTIRE METER IS RETURNED

##### CLASS 1 REPAIR

Remove seal wire, index box, index, top, valve cover and crank assembly. Inspect all parts. Regrind valve covers and valve seats. Clean and adjust mechanism. Reassemble meter with new gaskets and seal wire. Re-prove, pressure test, low light test, wash, paint and pack. **\$3.50 net**

##### CLASS 2 REPAIR

Remove parts listed in Class 1 repair plus flag arms, packing glands, collars, pins, valve plate from body and dismantle valve and crank assembly. Inspect all parts. Re-oil diaphragms. Regrind valve covers and valve seats. Repack glands. Clean and adjust mechanism. Reassemble meter with new gaskets and seal wire. Re-prove, pressure test, low light test, wash, paint and pack. **\$4.50 net**

##### CLASS 3 REPAIR

Remove parts listed in Class 1 and Class 2 repair plus disassembly of diaphragms from rods, leathers from pans. Inspect all parts. Install new diaphragm leathers and test. Straighten rods and assemble to pans. Regrind valve covers and valve seats. Repack glands. Clean and adjust mechanism. Reassemble meter with new gaskets and seal wire. Re-prove, pressure test, low light test, wash, paint and pack. **\$5.50 net**

Replacement of other parts will be at listed sale prices. Customer to pay freight both ways.

#### WHEN INTERNAL MECHANISM ONLY (VALVE PLATE ASSEMBLY) IS RETURNED

##### CLASS A REPAIR

Remove valve cover and crank assembly from valve plate. Re-oil diaphragms. Regrind valves and valve seats. Inspect all parts. Replace worn parts where required. Repack glands. Clean, adjust and re-prove unit in a meter body. **\$4.25 net**

##### CLASS B REPAIR

Disassemble entire unit. Install new diaphragm leathers and test. Regrind valves and valve seats. Inspect all parts. Replace worn parts where required. Repack glands. Clean, adjust and re-prove unit in a meter body. **\$5.50 net**

#### NEW INTERNAL UNIT PLAN (No return of old unit required)

After a period of years, the entire internal mechanism of the No. 00 meter can be completely renewed by simply inserting a factory-fresh valve plate assembly in the old meter body. Also a stock of extra internal mechanisms may be desired. All units are interchangeable and proof of meter is not affected. Everything in this assembly is entirely new, ready to give new meter performance. No turn-in of old unit is required. **\$8.50 net**

PITTSBURGH EQUITABLE METER DIVISION

Rockwell Manufacturing Company - Pittsburgh 6, Pa.



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# LETTERS

● **BUTANE-PROPANE** News welcomes letters from our readers, but it must be understood that this magazine does not necessarily concur in opinions expressed by them.—Editor.

Gentlemen:

We can't figure out just what is wrong with our bulk tank installation in which we have taken the return line from a differential valve back to the liquid line ahead of the pump and maybe we will have to take this clear back to the supply tank.

What information can you give us?

D.H.S.

Oregon

The by-pass liquid should be returned to the tank and not to the pump suction. If a considerable amount of the pump capacity is being by-passed, its temperature will be increased, tending to cause vaporization at suction pressure.—Ed.

Gentlemen:

We have and operate a 10,000-gallon propane storage and bottle filling equipment with a 1000-gallon propane truck tank.

We are contemplating putting in an 18,000 gallon storage for butane gas. Can we use our propane truck for distributing butane to the consumer user tanks one trip, then for propane without having to flush and clean the tank each time we change gases?

Would it be more practical to purchase another truck tank to handle the butane?

Would it be better if we put in a heavier storage tank for butane con-

templating that butane gas is going to be scarce and hard to get as time goes on?

R.J.S.

Kansas

You can safely handle butane in your propane tank truck but if you are making deliveries into user's tanks that are designed for low pressure butane gas it will be necessary to pump out any remaining propane returned in the truck. It is not necessary to flush the tank as a small amount of propane will not affect the vapor pressure of the butane enough to be serious.

However, if you are in a position to obtain another truck unit we would advise using one for butane and the other for propane to eliminate the possibility of a driver taking out a load of propane by mistake and filling butane tanks.

We would recommend the installation of a tank with working pressure high enough to handle propane even though you plan to use it for the next few years for butane.—Ed.

Gentlemen:

We would appreciate your advice as to the acceptability, and merit of the following procedure in installing LP-Gas feed, and distribution main(s). Low pressure lines.

Underground. Type "K" copper water tube.

Aboveground. Types "K" &/or "L" water tube. Hard and soft copper water tube.

Procedure has been to use all wrought fittings, solder type, with joints being made with silver solder. Feed main is extended as required, and tubing size copper with SAE fittings used to each fixture.

The question of the acceptability of a silver soldered joint has been made by an inspector, and we have

used the above procedure for the reasons in the following order:

No. 1. Silver soldered joint eliminates all threaded connections possible.

No. 2. Use of type "K" and "L" copper larger areas, and heavier wall thickness than tubings.

We feel that a silver soldered joint on copper corresponds with a fusion weld on steel pipe. The only exception being on remelt temperature of silver solder used which is some 600 degrees lower than the melting point of the copper used.

E.B.

### Colorado

The new National Board of Fire Underwriters Pamphlet No. 58 allows the use of soldered joints on copper as long as the melting point is over 1000°F.

Silver soldered joints in our opinion are more satisfactory than a threaded connection for your type of work.—Ed.

Gentlemen:

Nearly all our installations are either aboveground storage tanks or cylinder systems using vapor withdrawal with 2-stage pressure reduction, relying on the low boiling temperature of propane for vaporization. Due to the severity of the climate in this region, the service department has experienced some difficulty with installations not functioning because of lack of vaporization at temperatures between -35° to -45° F. This condition is most inconvenient for it occurs when the installation's services are most needed.

If we could use liquid withdrawal, running the liquid line to a low pressure regulator located inside the building, it would eliminate this vaporization problem.

There is some variance in opinion as to whether liquid withdrawal as outlined above is permissible under NBFU regulations. Could you please advise what installation practice

could be followed to eliminate the above difficulties and still be within NBFU regulations.

S.W.P.

### Alberta

Pressure reduction through a liquid regulator is usually unsatisfactory. This is due to the fact that all of the latent heat for vaporization must be absorbed by a relatively small regulator body and be transmitted through the parts to the point of expansion, which is at the orifice.

Ice or hydrates will form very fast, tending to stop the flow. This is true when the regulator is in a very warm atmosphere.

Your conditions are very severe. A method that might prove feasible for cylinder installations would be to install them in cabinets and run a line from the hot water heater with a small coil in the cabinet to provide enough heat for vaporization.

On your larger installations we would recommend the use of a heat exchanger for winter use.—Ed.

Gentlemen:

Sometime back we followed with considerable interest a series of articles appearing in *BUTANE-PROPANE News* under the heading, "Commercial and Industrial Applications."

It would be of great help to us to obtain a reprint on each of the articles in this entire series.

R.F.C.

### New York

We have recently arranged for the reprinting of 12 booklets containing reprints from past articles in *BUTANE-PROPANE News* and classified under various heads. Among these are two booklets devoted to commercial and industrial applications.

They are available for 50 cents per booklet, or \$5.40 for the 12.—Ed.

Gentlemen:

We installed the machinery in a new LP-Gas bulk plant recently, using heavy duty pipe and fittings. The pipe connections were sealed with litharge and glycerin and let stand for four days. After the gas was turned on the pipes became frosted

and then this soon melted, leaving water dripping from the pipes. This caused the litharge and glycerin to soften and leaks appeared in several places.

The cut threads were scrubbed with a wire brush and wiped free of all cutting oil. All joints were made up very tight.

We would appreciate it very much if you would give some information on what caused the litharge and glycerin to turn soft. We have two more plants to hook up but hesitate to use the litharge and glycerin for the reasons mentioned.

Perhaps you could recommend some material that has been found satisfactory for LP-Gas plant installations.

M.A.B.

New York

The use of litharge and glycerin for sealing pipe joints requires the ability of an old hand at the pipe fitting game. It is tricky and hard to use.

We would suggest that you use any of the flexible type joint pastes made for LP-Gas installations. These compounds have been found to be easier to install and consistently do a better job.—Ed.

Gentlemen:

How do you determine size of space heater or appliance to be used after you have determined size of room in which it is to be used? Is there a table on this in any of your books?

W.R.M.

Texas

This subject is exhaustively treated in "The Bottled Gas Manual," published by us.

It devotes 25 pages to this subject. Many tables appear in the chapter which will help you to figure space requirements, Btu inputs, and so forth.—Ed.

Gentlemen:

Is there a gauge or scale you can hook on a gas cylinder tank of 100-lb. size to tell how much gas there is in it?

R.V.

New Jersey

There is no gauge available that will tell the amount of fuel left in a propane cylinder.

A special pressure gauge marked in colors on the dial can be obtained that will indicate when the tank is about to run out. These can be obtained from your supplier.—Ed.

Gentlemen:

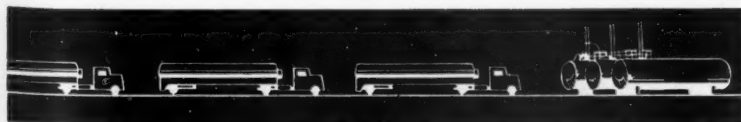
I am requested by a local concern to manufacture tanks of from 50-gal. to 300-gal. capacity to be used in storing butane and propane gases. Will you give me information concerning the requirements I must meet?

M.J.S.

Florida

Requirements for tank manufacture can be found by referring to the National Board of Fire Underwriters Pamphlet No. 58; the ASME Unfired Pressure Vessel Code; the API-ASME Unfired Pressure Vessel Code and to the "Handbook Butane-Propane Gases," published by us.

You should also check any Florida statutes covering the manufacture of equipment for our industry.—Ed.



## BEYOND THE MAINS

**T**HE WHY of safety is easy. There are humanitarian and altruistic reasons. And in a rapidly growing industry challenged at every step by sometimes unscrupulous competition, there are many self-interest reasons. For instance, the securing of insurance at a fair rate, and the adoption of national, state and local codes that are logical and fair, rather than motivated by temporary fanaticism.

The HOW of safety is not always so easy, when the human factor is involved.

As pointed out in this issue a year ago, it is possible to deal adequately with the mechanical elements through engineering design, specification and supervision, but human failures are responsible for the vast majority of accidents in this industry—and others.

This issue of *BUTANE-PROPANE News* deals with both the human and mechanical elements in safety.

It's interesting sometimes to look into the other fellow's mind, or try to. Take insurance men.

Insurance men have plenty of problems these days. When something is destroyed by a windstorm, for instance, it takes more money than one might think to replace it.

If we recall the figures correctly, there has been a case recently when due to windstorm, insurance companies had to make certain repairs, and bricklayers charged three times as much per hour for laying 60% as many bricks as they would have a few years ago.

It's a fact, and no use ducking it, that some insurance companies have more business than they want these days. Some think they have too heavy coverage in certain lines; for instance, in windstorm.

The LP-Gas industry comes on the scene, newly developed as a great industry, at a time when there's a seller's market in insurance. It must win its way. Other, older businesses have the inside track. In this effort, a safety record is all-important.

Around the country, we've picked up a few hints on what LP-Gas operators can do to help get the insurance coverage they want. One idea is to find a friendly insurance man and give him all one's insurance business of every kind; not give different kinds of business to different agents.

Another obvious idea is to establish a good safety record, so that the record of experience will be good. An individual can build up a good record. The operators in a state can get together and build up a good record. The industry nationally can build up a good record, year by year.

The way to start doing something about these situations is to look at them from the other fellow's point of view—the insurance man's. Like the LP-Gas man, he's out to make money. He wants to find business in which the premiums will roll in, and where losses, with reasonable certainty, can be divided up over a period of years, so that no one company will get a sufficiently severe blow or succession of blows to sink it.

A few smart insurance men these days, we understand, are plenty interested in the LP-Gas business. They know it's new and coming and that some day some of them are going to hitch onto it and make some money.

The automobile was looked at askance less than half a century ago. Yet look at the insurance business in it today, and lucky are the insurance people who got in on the ground floor of that business at the right time. And look at aviation, a more risky business than LP-Gas ever thought of being. Twenty years ago, it's said some of the conservative airlines of today had trouble getting insurance. But we know an individual who has a very prosperous looking office today on 42nd Street, New York, specializing on aviation coverage.

That may well be the situation just a few years from now of progressive insurance men of today who are busy learning the LP-Gas business and how to differentiate between good and bad risks.

One factor plaguing insurance men now is that the public is far more insurance claim-conscious and lawsuit-alert than formerly. An insurance friend asserts that if a man has windstorm insurance on his summer home on the Atlantic Coast, he may not bother to reshingle his roof when it's needed. He just waits a few years for a good big windstorm, which will loosen the shingles a little bit more, and then he'll try and get the insurance company to do the reshingling.

The more members of the industry learn what goes on in insurance men's minds, the better it will be. A good move was that of the Tennessee Liquefied Petroleum Gas Assn., which had the guts to invite a frank-talking insurance man to Nashville to go into detail about what he had learned about how to avoid accidents. This man impressed us as the kind of fellow who will see the job through, the sort the industry will do well to have on its side. With all the criticism he leveled, he pointed out that LP-Gas is as great a gift to the rural resident as was the automobile.

And like the automobile (also a basically safe device which, through human error, occasionally has accidents), LP-Gas is here to stay—and how!

Ed Titus

# INTRODUCING THE SECOND

The second annual safety issue of BUTANE-PROPANE News is presented at a time when the subject of safety has assumed greater significance than ever before, due to the present day problems of insurance.

The first issue dealt with ways to operate safely, stressing plant procedure. This one condenses and reviews the original data presented in the 1948 safety edition so every new reader will have complete basic information and, in addition, presents detailed safe practices found useful in preventing accidents and losses at the point of use and in transportation.

# ANNUAL SAFETY EDITION

LP-Gas is a safe fuel but, like every other source of energy, must be handled and used under control. Accidents that happen any place in our industry are usually preventable, as they are generally the result of human carelessness or ignorance. The designed appliances and equipment are eminently safe.

BUTANE-PROPANE News herewith summarizes in concise and graphic form the experience gained over past years so that these annual safety issues may provide a central source of information on good practices that always will be available to industry members.

# FIRE LOSS

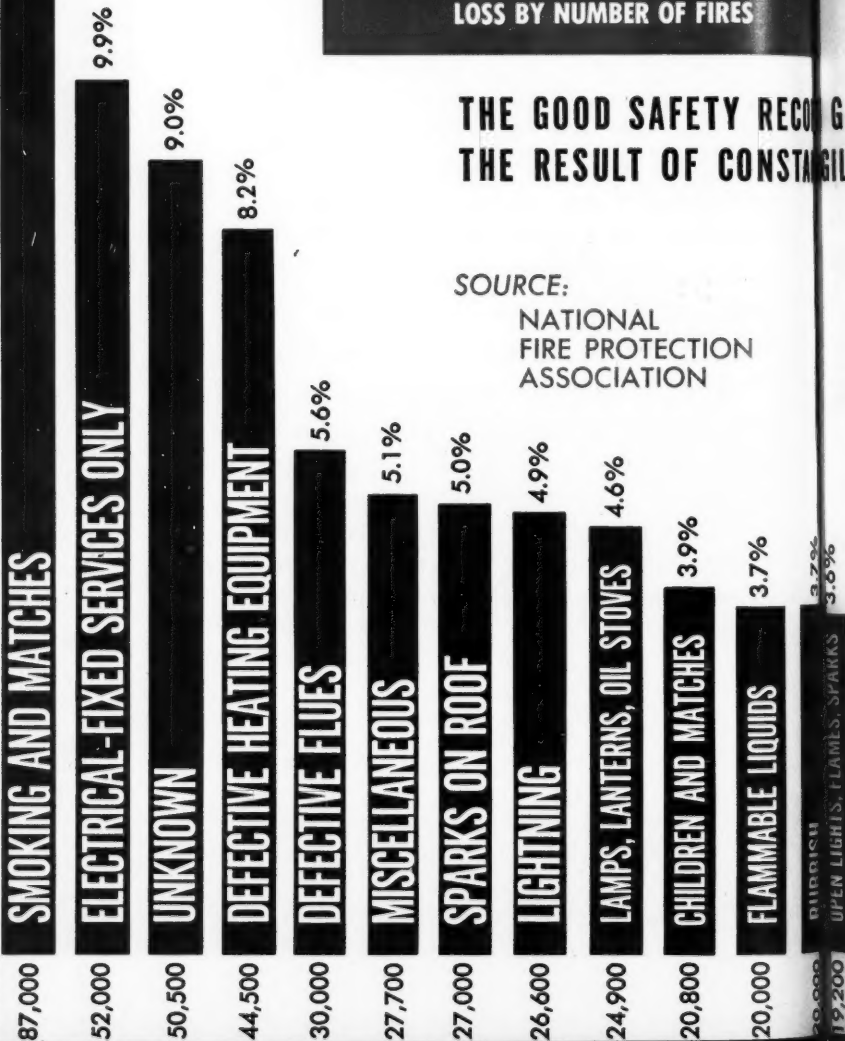
DISTRIBUTION CHART FOR 1941

LOSS BY NUMBER OF FIRES

THE GOOD SAFETY RECORD  
THE RESULT OF CONSTANT

SOURCE:

NATIONAL  
FIRE PROTECTION  
ASSOCIATION

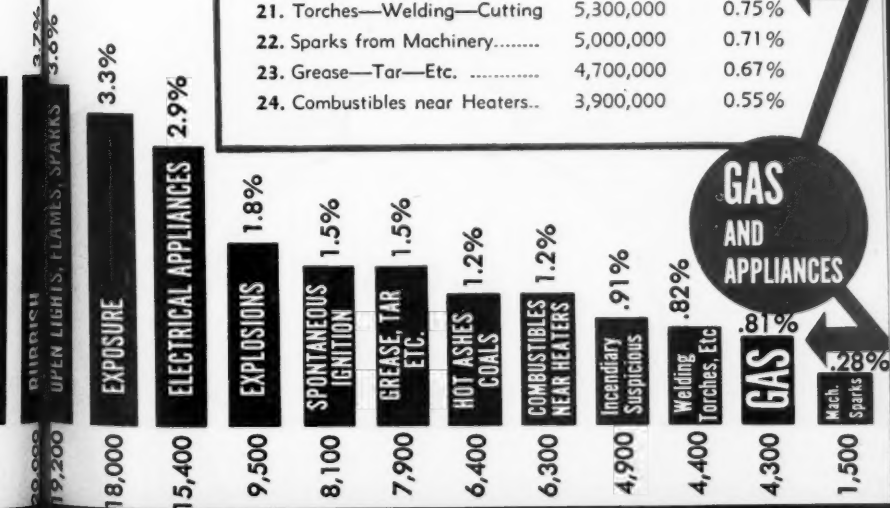




# DOLLAR LOSS

	Dollar Loss	Per Cent
1. Unknown .....	\$208,000,000	29.6%
2. Explosions .....	77,000,000	11.0%
3. Defective Heating Equipment	56,000,000	8.0%
4. Electrical Fixed Service.....	56,000,000	8.0%
5. Smoking and Matches.....	51,500,000	7.3%
6. Lamps, Lanterns, Oil Stoves..	26,600,000	3.78%
7. Exposure .....	24,900,000	3.54%
8. Flammable Liquids .....	21,800,000	3.1%
9. Lightning .....	20,400,000	2.9%
10. Spontaneous Ignition .....	19,700,000	2.8%
11. Sparks on Roof.....	19,500,000	2.77%
12. Chimneys, Flues .....	16,900,000	2.4%
13. Open Lights, Flames, Sparks	16,400,000	2.3%
14. Electrical Appliances .....	12,300,000	1.7%
15. Miscellaneous .....	11,900,000	1.69%
16. Hot Ashes—Coals .....	11,400,000	1.6%
17. Incendiary—Suspicious .....	10,800,000	1.5%
18. Children and Matches.....	8,300,000	1.18%
19. Rubbish .....	6,700,000	0.95%
20. GAS AND APPLIANCES.....	5,900,000	0.84%
21. Torches—Welding—Cutting	5,300,000	0.75%
22. Sparks from Machinery.....	5,000,000	0.71%
23. Grease—Tar—Etc. ....	4,700,000	0.67%
24. Combustibles near Heaters..	3,900,000	0.55%

ECON GAS IS  
STAGILANCE



# INSTALLING APPLIANCES

The industry's reputation for safety calls for approved appliances and equipment, correctly installed.

**VENTED  
CONSOLE HEATER**



BATH  
HEA

THRO

**RADIANT  
FIRE PLACE  
HEATER**

**GAS  
REFRIGERATOR**

**BATHROOM  
HEATER**

**MODERN  
GAS RANGE**

**LIVING ROOM**

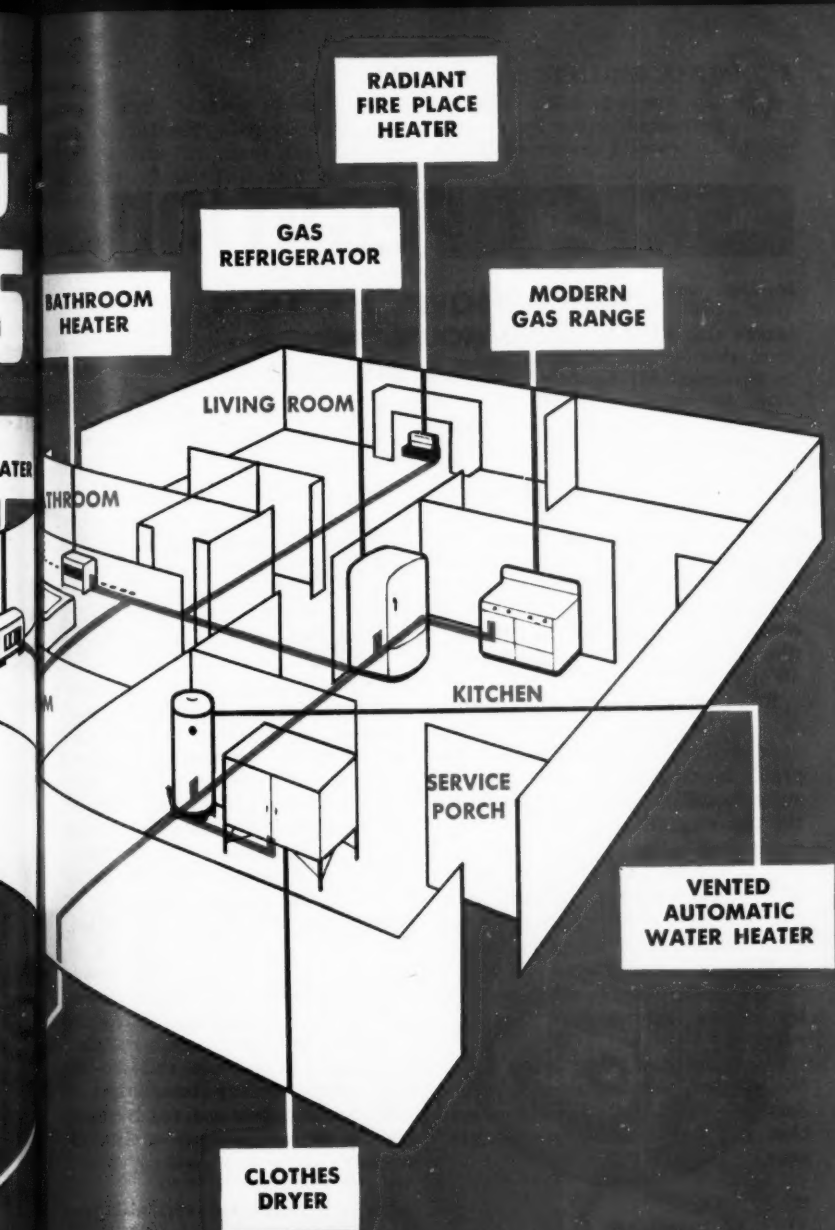
**BATHROOM**

**KITCHEN**

**SERVICE  
PORCH**

**VENTED  
AUTOMATIC  
WATER HEATER**

**CLOTHES  
DRYER**



# SAFE OPERATION

WITH APPROVED APPLIANCES  
AND HOUSE PIPING  
CORRECTLY INSTALLED

THE installation of gas appliances is one of the principal functions of an LP-Gas dealer. His manner of making them affects their safety and efficiency of operation, the satisfaction of the purchaser and, possibly, the reputation of the fuel in the user's community.

Records that are available indicate that the way in which appliances are installed even has considerable bearing upon some of the insurance difficulties experienced by the industry. This is because accidents that happen in the home usually result in insurance claims in which the gas dealer is named regardless of the fact that the user may have altered an adjustment, installed a non-approved appliance or had made changes or repairs in the piping unknown to the fuel supplier.

There are many appliances upon the market, some that are excellent for use with LP-Gas, others that are fair, and some that are poor.

Appliances are installed by builders, plumbers, heating contractors and by LP-Gas dealers. They are sold by department stores, furniture stores, plumbers, heating contractors, mail order houses, second-hand stores, and LP-Gas dealers.

The customer is an individual with an individual's desire to do business where he pleases and there is no way our industry can control these variable factors.

After the installation is in, the LP-Gas dealer has to live with it, service it, and, often due to this service, open himself to responsibility for accidents that occur as a result of unwise selection of equipment or faulty installation. One thing the dealers can do to protect and to improve the standards of gas service and customer satisfaction is to become thoroughly conversant with good installation practice and use this knowledge when making installations.

Within the area covered by most dealers there are only a limited number of others selling appli-

## INSTALLING APPLIANCES

developed a line of stoves and refrigerators that adapt themselves to the old or the modern kitchen.

### SELECTION, CONVERSIONS

ances and making installations. Get acquainted with these people and explain to them the characteristics of the fuel and good installation practice and let them know the reason the industry wants and needs proper utilization equipment and safe installations.

The field of appliances covers many items but they break down into the four essential uses — cooking, refrigerating, water heating, and space heating.

The essential requirements for safe and satisfactory installations will be described with the reasons for the requirements.

### RANGES REFRIGERATORS

The stove and refrigerator are functional units of the kitchen and as such, their location is subject to considerations of convenience in use as well as to the ideal operating conditions.

The dealer will meet with all types of kitchen requirements, ranging from a two-burner hot plate to a double oven, eight top burner range installation, and each is a compromise between what the customer would like to have and what she can afford or accommodate.

With the housewife's idea of where the equipment should be placed, what the architect or builder supplied in the size and shape of the kitchen, where the plumber located the sink, and what the ideal installation should be, will determine the eventual location of the kitchen appliances.

However, the gas industry has been aware of this state of affairs and has

1. The appliance to be installed should be manufactured to comply with the requirements for safe operation, substantially and durably constructed, and meet the standards of acceptable performance as set forth in the latest American Gas Assn. approved requirements for such appliances and bear the AGA Laboratories seal of approval for LP-Gas.

2. When the dealer finds that the homeowner has purchased an appliance not meeting with the requirements for LP-Gas, he should advise the owner of the fact and if it is a new one, attempt to have the owner exchange it for an LP-Gas unit. If this is not possible, determine from the manufacturer what changes are necessary to alter the unit so it will function safely on LP-Gas and make these changes before making the installation.

Major changes or alterations should



## INSTALLING APPLIANCES

be done in the shop so testing and adjusting can be done under controlled conditions.

3. When the dealer finds a used stove that has been moved into his area from natural or manufactured gas lines, advise the customer of the differences in the gas and secure the proper burners and parts from the manufacturer and make a first class conversion.

4. Some stoves can be satisfactorily changed over to LP-Gas by changing the gas orifice size, if the venturi and primary air inlet are large enough to handle the higher Btu gas. However, when making this change, do not rely on the adjustment of an adjustable orifice. Remove it and in its place install a fixed orifice of the proper size.

The reason it is not good practice to attempt to use the adjustable orifice is that it was designed for a lower Btu gas and when closed enough to meter the high Btu gas, it will usually be so far closed that the gas does not have a clear passage and will be deflected to one side, causing poor air inspiration and poor burner performance.

5. In making conversions, remember that all gas burners are rated on a Btu capacity and not on a cubic-foot-per-hour-of-gas capacity. The burner that was being used successfully on natural or manufactured gas was designed to mix efficiently the proper amount of air for complete combustion and had a gas orifice large enough to pass a sufficient quantity of low Btu gas to give the burner a definite capacity.

If the burner is used on LP-Gas without making the proper orifice change, it will pass three times as much gas as it can handle if it was originally on natural gas, and six to seven times as much if it was used on manufactured gas. A much smaller

orifice must be substituted. The accompanying tables indicate orifice sizes for various makes of stoves bearing AGA approval at date of first publication, March, 1947

6. Pilot lights and oven burners are more difficult to convert than top burners, and before attempting to change over any automatic features, such as clock control, the manufacturer should be consulted to determine if it is feasible or not.

## TESTING

1. Check the range valves. They should be taken apart, cleaned and greased with a lubricant that will hold LP-Gas. Some stove cocks are not suitable for use with LP-Gas as they cannot be made to hold tight. If such are found, they should be removed and proper valves installed.

2. Check the manifold piping for leaks, especially where the valves are screwed into the manifold. Usually it is necessary to remove the valves, clean the threads, and use a pipe compound that will hold LP-Gas.

3. Some burners that function well on natural or manufactured gas operate poorly on LP-Gas due to size and spacing of burner ports. If a burner will not light all around or burns with a yellow tip after the correct size orifice has been installed, it is possible that the ports are too large and are spaced too far apart. When this trouble develops, the cost of a new burner is likely to be less than the cost of trying to adapt it to LP-Gas.

4. Burner height usually does not affect the safety of the installation but burners set too low are uneconomical and may cause high bill complaints.

## CONNECTING, INSTALLING

## INSTALLING APPLIANCES

ments for the construction, material and specifications of such tubing connectors of the AGA, or other nationally recognized standards.

The method of attaching tubing connectors to the appliance and house piping should not depend upon ferrules, washers, gaskets or other detachable parts. Flare type fittings are satisfactory.

No part of the tubing should be concealed in, or pass through, walls, floors or partitions.

2. Level up the appliance. Ranges should be set so the top section and the oven sections are level in both directions. If the floor is out of plumb, use a shim under the supports that cannot be knocked out. Level working surfaces are essential for customer satisfaction and safety for top burner and oven operation.

3. Locate the stove where wind currents are not apt to affect the burner operation.

4. Locate the stove where there is ample ventilation available for proper combustion of the gas.

5. When stoves are set in recessed areas, allow ample clearance between the sides and the back and the walls for ventilation and air circulation. Remember the back part of the oven burner wants secondary air.

6. On most of the present day ranges, the top burners are not vented and on many stoves the oven vent terminates at the top of the back. As far as safe operation is concerned, the products of combustion of a well adjusted stove represent no problem. However, for customer satisfaction and comfort and cleanliness in the kitchen, a means of ventilating or removing these products, plus the steam and odors from cooking utensils, is very desirable.

7. After the gas has been turned

1. Make a good connection between the house piping and the appliance. Some kind of a connection is necessary. There are several methods.

a. Right hand - left hand coupling. An excellent type of connection is that of a left hand-right hand malleable coupling. This is a special fitting obtainable in plumbing supply company stocks and requires the use of a nipple with a left hand thread at one end.

The coupling is used in place of a union. Piping is made up solid from the appliance to the stub of the house piping, with the end of the left hand thread nipple nearly flush with the end of the house piping stub. The left hand coupling is engaged into the ends of both pipes simultaneously and when it is screwed up it makes a tight threaded connection to each pipe end. The advantage of this connection is that it is a flush fitting and does not depend upon seated surfaces for a tight closure.

b. Union connection. Piping between the appliance and the house piping can be connected with a union. When unions are used, they should be located in such a manner that they are accessible and can be tightened easily. Only malleable iron or steel ground joint unions should be used. Unions having a gasket seat are not recommended for appliance connections.

c. Seamless metal tubing connections. When the length of the connection between the house piping stub and the appliance is less than six feet, the use of a seamless metal tubing connection is allowable. When such connectors are used they should bear the seal, or insignia that shows they comply with the approval require-

# ORIFICE SIZES

## FOR LP-GAS DOMESTIC RANGES

	STANDARD TOP BURNER	Propane	50-50 Butane- Propane	550 Btu Air-Gas Mix	1000 Btu Air-Gas Mix	1400 Btu Air-Gas Mix	Natural Gas		GIANT TOP BURNER	Propane	50-50 Butane- Propane	550 Btu Air-Gas Mix	1000 Btu Air-Gas Mix	1400 Btu Air-Gas Mix	Natural Gas
A-B Stoves .....	72	..	..	..	..	..	..			..	..	..	..	..	..
American Stove (Magic Chef) .....	70	70	36	42	54	54			68	68	32	36	51	51	
Anderson Stove .....	71	..	..	..	..	51			70	..	..	..	..	..	51
Andes—No. 105 .....	69	..	..	..	..	52			..	..	..	..	..	..	..
Andes Nos. 53-54, 4600, 4600 .....	69	..	..	..	..	52			..	..	..	..	..	..	..
Athens (Vesta) .....	70	70	..	..	..	45			..	..	..	..	..	..	..
Automatic (Royal Rose) .....	70	71	37	48	51	52			..	..	..	..	..	..	..
Auto (Autocrat) Nos. 41-16, 16-41, 490 .....	70	70	42	42	..	42			..	..	..	..	..	..	..
Borg-Warner (Norge) .....	70	70	36	36	36	36			68	68	36	36	36	36	46
Borg-Warner (White Star) .....	70	70	36	36	36	46			68	68	36	36	36	36	46
Caloric .....	71	72	A	A	A	A			60	69	A	A	A	A	A
Chambers .....	68	68	31	46	..	54			..	..	..	..	..	..	..
Comstock-Castle (Economy) .....	70	70	39	52	52	52			67	67	30	39	39	39	39
Copper-Clad Nos. 41-D-18-B, 4423-C-G .....	72	72	..	..	..	52			70	70	..	..	..	..	52
Cribben & Sexton (Alltrol) .....	68	71	31	52	52	52			66	58	68	31	52	52	52
Cribben & Sexton (Clic-Set) .....	67	70	31	52	52	52			65	66	31	52	52	52	52
Crosley .....	71	71	45A	52A	52A	45A			69	69	39A	49A	49A	45A	
Crown (Harper) .....	71	72	36	48	52	..			69	70	36	48	52	..	..
Crown (Onica) .....	71	70	36	48	52	..			69	68	36	48	52	..	..
Detroit-Michigan (Onica Thrift) .....	70	71	28	42	..	48			67	69	28	42	..	48	
Detroit-Michigan (Simmer Cook) .....	72	73	36	45	..	52			69	71	36	45	..	52	
Dixie .....	72	..	..	..	..	..			..	..	..	..	..	..	..
Dwyer (No. 480) .....	71	71	..	..	..	42A			69	69	..	..	..	..	42A



# ORIFICE SIZES

## FOR LP-GAS DOMESTIC RANGES

	STANDARD TOP BURNER	Propane	50-50 Butane- Propane	550 Btu Air-Gas Mix	1000 Btu Air-Gas Mix	1400 Btu Air-Gas Mix	Natural Gas		GIANT TOP BURNER	Propane	50-50 Butane- Propane	550 Btu Air-Gas Mix	1000 Btu Air-Gas Mix	1400 Btu Air-Gas Mix	Natural Gas
Estate.....		70	71	36	..	..	48			69	70	36	..	..	48
Florence.....		69	71	35	..	..	46			67	69	35	..	..	42
Floyd-Wells.....		70	71	..	..	..	52			68	69	..	..	..	52
Glenwood.....		70	70	..	..	..	52			68	68	..	..	..	52
Globe-American.....		72	72	33	..	..	52			71	71	33	..	..	40
Graham (Wedgewood).....		68	68	35	48	52	52			64	64	35	48	52	52
Graham (Alltrol).....		69	69	48	48	52	52			67	67	48	48	52	52
Grand.....		70	70	35	..	..	36			69	69	35	35	35	36
Hardwick.....		70	71	31	46	..	39			68	69	31	46	46	39
Kalamazoo.....		70	70	36	36	36	52			68	68	36	..	..	52
Moore (Harper).....		72	73	36	..	..	52			69	71	36	..	..	52
Moore (Onica).....		70	71	36	..	..	52			67	69	36	..	..	52
Odin.....		71	..	38	..	..	40			68	..	38	..	..	40
O'Keefe & Merritt.....		69	70	44	..	..	52			65	66	40	..	..	52
Roberts & Mander (Quality Standard).....		70	71	30	52	52	52			67	69	30	52	52	52
Roberts & Mander (Quality Simmer).....		72	73	30	52	52	52			69	71	30	52	52	52
Roper.....		70	70	31	..	..	52			68	68	31	..	..	50
Ross.....		70	71	37	48	51	52			..	..	..	..	..	..
Round Oak.....		70	..	..	..	..	..			68	..	..	..	..	..
Slatery.....		71	..	31	..	..	52			..	..	..	..	..	..
Sunray.....		70	70	37A	52A	52A	52A			..	..	..	..	..	..
Tappan.....		70	72	31	..	..	41			68	70	31	..	..	42
Tennessee (Modern Maid).....		70	..	..	..	..	..			..	..	..	..	..	..
Weiskittel Co. (Real Host).....		70	..	..	..	..	..			..	..	..	..	..	..
Welbilt.....		70	70	..	..	..	52			..	..	..	..	..	..

# ORIFICE SIZES

## FOR LP-GAS DOMESTIC RANGES

	OVEN BURNER	Propane	550 Btu Air-Gas Mix	1000 Btu Air-Gas Mix	1400 Btu Air-Gas Mix	Natural Gas	Natural Gas		BROILER BURNER	Propane	50-50 Butane- Propane	550 Btu Air-Gas Mix	1000 Btu Air-Gas Mix	1400 Btu Air-Gas Mix	Natural Gas
A-B Stoves.....	57	..	..	..	..	..	..			..	..	..	..	..	..
American Stove (Magic Chef).....	55-54	55-54	22-20	26-22	43-40	43-40				56	56	30	39	51	51
Anderson Stove.....	58	..	..	..	..	36				57	..	..	..	..	36
Andee—No. 105.....	57	..	..	..	..	31				..	..	..	..	..	..
Andee—Nos. 53-54, 4600, 4800.....	55	..	..	..	..	31				56	..	..	..	..	31
Athens (Vesta).....	55	55	..	..	..	30				55	55	..	..	..	30
Automatic..... (Royal Rose)	56	57	28	37	44	45				..	..	..	..	..	..
Auto (Autocrat) Nos. 41-18.....	56	56	24	24	24	24				..	..	..	..	..	..
Auto—No. 18-41.....	56	56	36	36	36	36				..	..	..	..	..	..
Auto—No. 490.....	60	60	24	24	24	24				..	..	..	..	..	..
Berg-Warner (Norge).....	55-56	55-55	18	18	18	22				..	..	..	..	..	..
Berg-Warner (White Star).....	22	22	18	18	18	22				56	56	18	18	18	22
Caloric.....	56	56	A	A	A	A				56	56	A	A	A	A
Chambers.....	55	55	20	39	..	46				55	55	20	39	..	46
Comstock-Castle (Economy).....	58	58	30	39	39	39				58	58	30	39	39	39
Copper-Clad No. 41-D-18-B.....	56	56	..	..	..	42				..	..	..	..	..	..
Copper-Clad No. 4423-C-G.....	53	53	..	..	..	42				..	..	..	..	..	..
Cribben & Sexton (Airtrol).....	55	56	20	40	40	40				..	..	..	..	..	..
Cribben & Sexton (Click-Set).....	55	56	20	40	40	40				..	..	..	..	..	..
Crosley.....	56	56	30A	42A	42A	30A				58	58	30A	46A	46A	30A
Crown (Harper).....	..	55	30	40	45	..				..	56	31	42	45	..
Crown (Onica).....	..	55	30	40	45	..				..	56	31	42	45	..
Detroit-Michigan (Onica Thrift).....	55	56	20	20	..	38				..	..	..	..	..	..
Detroit-Michigan (Simmer Cook).....	55	56	20	20	..	38				..	..	..	..	..	..

# ORIFICE SIZES

## FOR LP-GAS DOMESTIC RANGES

	OVEN BURNER	Propane	50-50 Butane- Propane	550 Btu Air-Gas Mix	1000 Btu Air-Gas Mix	1400 Btu Air-Gas Mix	Natural Gas		BROILER BURNER	Propane	50-50 Butane- Propane	550 Btu Air-Gas Mix	1000 Btu Air-Gas Mix	1400 Btu Air-Gas Mix	Natural Gas
Dixie.....	58	..	..	..	..	..	..			..	..	..	..	..	..
Dwyer (No. 480).....	56	56	..	..	..	32A	..			59	59	..	..	..	38A
Estate.....	55	55½	16	..	..	32	..			58	59	16	..	..	32
Florence.....	56-57	57-58	24	..	..	24	..			56	57	24	..	..	24
Floyd-Wells.....	56	57	..	..	..	31	..			57	58	..	..	..	31
Glenwood.....	.050"	.050"	..	..	..	42	..			56	..	..	..	..	42
Globe-American.....	54	54	25	..	..	28	..			..	..	..	..	..	..
Graham (Wedgewood)...	56	56	18	32	40	40	..			..	..	..	..	..	..
Grand.....	56	56	29	29	29	29	..			57	57	29	29	29	29
Hardwick.....	55½	56	15	31	41	33	..			55½	56	..	15	41	33
Kalamazoo.....	57	57	25	..	..	38	..			..	..	36	..	..	38
Moore (Harper).....	54-55	55-56	24	..	..	31	..			55-56	56-57	24	..	..	31
Moore (Onica).....	54-55	55-56	24	..	..	31	..			..	..	..	..	..	..
Odin.....	55	..	30	..	..	25	..			58	..	30	..	..	25
O'Keefe & Merritt.....	54	55-56	29-25	..	..	45-43	..			60	61	34	..	..	44
Roberts & Mander (Quality Standard).....	55	56	18	42	42	42	..			55	56	18	42	42	42
Roper.....	55	55	15	..	..	38	..			55	55	15	..	..	43
Rose.....	56	57	28	37	44	45	..			..	..	..	..	..	..
Round Oak.....	56	..	..	..	..	..	..			..	..	..	..	..	..
Slattery.....	56	..	26	..	..	44	..			..	..	..	..	..	..
Sunray.....	57	58	30A	40A	40A	40A	..			60	60	32A	43A	43A	43A
Tappan.....	55	56	22	..	..	31	..			..	..	..	..	..	..
Tennessee (Modern Maid).....	55½	..	..	..	..	..	..			..	..	..	..	..	..
Weiskittel Co. (Real Host).....	56	..	..	..	..	..	..			..	..	..	..	..	..
Weibull.....	56	59	..	..	..	40	..			56	56	..	..	..	40

## INSTALLING APPLIANCES

into the lines a thorough check for leakage should be made on the connection and piping from the house piping stub to the stove inlet.

Further checks for leaks should be made on all appliance lines and sub-lines such as oven heat control lines. Any leakage should be stopped before adjusting stove.

### ADJUSTING

1. After all connections, valves and piping have been found tight, the burners should be adjusted for proper flame. After each individual burner has been adjusted, all burners should be turned on, including the oven and broiler, and allowed to burn until full oven heat has been obtained. Burners should be observed for proper operation and low flame on oven burners checked by slamming oven door. Pilot flames or low oven burner flames should continue even with hard slamming of the oven doors as the user may operate in this way at times.

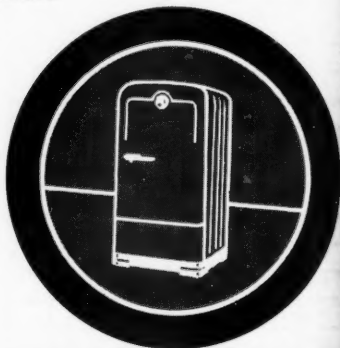
2. Check pressure at the appliance under full load to insure there is no constriction in the house or connecting piping.

#### Tell Users What to Do

3. While adjusting and trying out range, explain to the users its operation, safe way of lighting, the use of the pilots, oven controls and broiler. Have the users turn off and light the top burners and oven burners a number of times until they become familiar with the operation. Although most housewives are familiar with gas, remember there are many rural users to whom gas is new. Time spent in courteous explanation of the appliance and its operation will pay dividends in safety and customer satisfac-

tion.

4. Instruct the user where and how to shut off the gas should it be desired to do so sometime in the future. LP-Gas systems and appliances are simple to those who know something about them but present vague questions to the newcomer. Explain the simplicity and ease of operation. It is one of the industry's best talking points. No switches, no wires, no shocks.



### INSTALLING SERVEL

The gas refrigerator is the best refrigerator. It is simple to install.

1. The refrigerator must be set level to allow the flame from the burner to rise vertically into the heating element.

2. No vents are required from the refrigerator because the Btu input is so small that ordinary room ventilation is sufficient.

3. Air must be provided for cooling the condenser. This requires locating the box so air circulation is available in the back of the box where the condenser is located.

4. Good air circulation can be pro-

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vided by keeping the back of the box at least 6 inches and preferably 12 inches from the wall.

5. Good air circulation is impeded if shelves are installed over the unit. These should be avoided so the warm air can rise freely. The minimum distance from the top of the refrigerator to a shelf is 12 inches.

6. When built-in cabinets are desired above a refrigerator, a minimum of a 2-inch space should be allowed between the back of the cabinet and the wall and between the top of the cabinet and the ceiling.

## WATER HEATERS

### SELECTION, CONVERSIONS

1. When the LP-Gas dealer has an opportunity to advise in the selection of the water heater, it can be properly sized from the AGA table on recommended sizes.

2. The water heater should bear the approval of the AGA Testing Laboratories for use with LP-Gas.

3. When the dealer is called on to

## INSTALLING APPLIANCES

furnish LP-Gas to an installation that has a water heater that does not carry the approval of the AGA, he should advise the owner and check with the manufacturer to determine if it can be changed safely for operation on LP-Gas.

4. Any automatic water heater not having a 100% safety pilot and main burner shutoff should not be connected for use with LP-Gas until the safety features are installed in it.

5. When found, adjustable orifices should be removed and replaced with fixed orifices of the proper size for the Btu input of the water heater.

6. It may be necessary to raise the burner for economical operation on LP-Gas but when doing so, care should be taken to allow for sufficient secondary air to reach the burner. This is especially true with heaters with concave bottoms.

### CONNECTING, INSTALLING

1. Water heaters should always be installed in a location from which a vent can be run properly.

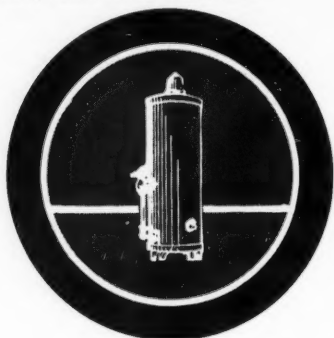
2. Location of a water heater in a bathroom, bedroom, bed closet, clothes closet, garage, restroom or in any

TABLE 1. Minimum Recommendations for normal, average, domestic hot water requirements.

Number of Bathrooms	Number of Bedrooms	Storage Capacity in Gallons*
1	1 or 2	30
1	3 or 4	40
2	2 or 3	40
2	4 or 5	50
3	3	50
3 or 4	4 or 5	75

\* For homes that have more than 4 bathrooms, add 10 gallons storage capacity for each additional bathroom.

## INSTALLING APPLIANCES



room having a floor area of less than 50 sq. ft. and opening directly into any bedroom, clothes closet or bathroom is not recommended.

3. Location on a service porch or in the kitchen comparatively close to the points of a major hot water use will reduce operating cost.

4. When located in a service room or closet, provision for ventilation must be made for an ample supply of air for combustion. The room should be ventilated at the top and bottom with a total area of the opening at least 1 sq. in. for every 1000 Btu input rating and minimum of 200 sq. in.

5. Set the water heater so the door to the burner compartment is easily accessible and not facing into a corner or side wall.

6. Install a shutoff valve in the line ahead of the water heater in a location easily accessible and within convenient reaching distance of a person lighting the burner.

7. If the water heater is installed in a system of closed piping or where the inlet and outlets can be turned off by valve, a water pressure relief valve should be installed in the system.

8. When a water heater is found

located in a basement or depressed area, means for floor ventilation should be provided to prevent accumulation of gas in case of a leak or failure of the automatic shutoff.

## LIGHTING, ADJUSTING

1. Before lighting the water heater, be sure it is filled with water, as damage can be done by applying heat to an empty tank.

2. Check connections for leaks with soap suds.

3. If any leaks are found, correct the cause and gas-free the floor and burner area by use of a bellows or other means to dissipate collected gas to prevent a flash-back when lighting.

4. Follow instructions printed on the water heater or on the shipping card.

5. Considerable time will be required to purge the air from the gas piping on the water heater through the pilot opening. Be patient and use a tape torch or candle to keep a flame available to ignite the gas when it finally arrives at the pilot burner.

6. After the pilot has been burning long enough to hold in the open position, turn on main burner.

7. Observe flame and set air shutters on the burner for a clean blue flame. Set thermostat for 120°F and allow heater to operate until the temperature control shuts off the main burner.

8. Check pilot light for proper flame size and contact with element.

9. Check for water leaks in the tank (When first starting, some condensate may collect and drop back over the burner, appearing like a water leak. After heater has been operating long enough to warm up the tank and the vent pipe, condensate forma-



## INSTALLING APPLIANCES

tion should stop. If moisture continues, it is from a leak in the tank or from using a type or size of vent not suitable for the purpose.)

10. Check burner operation by moving thermostat up and down a number of times.

11. After water heater has been found to be in correct operating condition, shut off main gas valve in line to heater and observe action of the automatic shutoff in burner and pilot.

12. Relight the heater and have the customer look over the installation, explaining operation and setting of thermostat. Have customer shut off main gas valve and observe action of safety pilot and burner shutoff. Then have owner relight the heater in the manner prescribed by the manufacturer.

13. Do not put your face near the door of the burner compartment when lighting a water heater.

14. Never turn gas on to a manually controlled water heating device unless there is a water pressure relief valve in the tank as it is possible to build up high pressure on the water tank if by mistake the heater is not shut off at the proper time.

15. Advise the customer that the flame from the pilot light is doing useful work and there is no economy in shutting it off at night. (It has been found that some customers through lack of knowledge believe a saving in gas use can be made by shutting off the pilot at night.)

is the portable type, including console room heaters, gas steam room heaters and portable radiant heaters, all of which can be obtained in the vented or unvented type.

All of these LP-Gas heaters have a useful purpose and can be installed to give safe and satisfactory service.

## SELECTION. LOCATION

1. Selection of heating equipment is surrounded by so many factors that no specific rules can be made to apply. The factors include type and size of building, weather conditions, use of the building, heating requirements and costs.

2. In the case of central heating and air conditioning units, the selection is usually made by the architect or builder.

3. All-year gas air conditioning units are fully approved and besides furnishing heat in the winter, provide cooling in the summer. Selection of size and location is based upon survey and recommendation of the manufacturer.

4. Central heating units are either forced circulation or gravity type.

5. The forced circulation units can be installed in a service room and the same rules regarding location that apply to water heaters apply to this type of heating system.

6. Gravity type heaters are usually found located in basements and often have been converted from oil or coal operation. Positive floor ventilation should be provided before they are put to use on LP-Gas or LP-Gas-air mixtures.

7. Floor furnaces, although built into the house, are often installed after the structure has been built. They should be located where a flue

## HEATING EQUIPMENT

Space heating equipment can be broken down into two types. First is the built-in type, including central furnaces, air conditioning units, floor furnaces, and radiant heating. Second

## INSTALLING APPLIANCES

connection can be made, where the installation will not affect the structural members of the building, and where bottom ventilation is possible.

8. Direct-fired, wall, radiant heaters are often installed after the building has been occupied. They should be located to take advantage of the radiation for heating and in a wall section where there is sufficient space to properly install an adequate vent.

9. Portable room heaters, such as the console type, gas steam and radiants, can be located where the heat output can be used to best advantage. The selection of and use of these heaters should take into consideration ventilation, spot heating requirements and safety.

Due to the fact that there are many manufacturers and sales outlets for radiant and console type heaters, they should be selected from the AGA approved groups.

## CONVERSIONS

Due to the many types of heating equipment and the easy portability of the room heating type, it is entirely possible that gas heaters not designed for use with LP-Gas will infiltrate into areas served by LP-Gas dealers.

When requested to convert these heaters to LP-Gas service, the dealer should take them to his shop and make a thorough changeover.

1. First, check with the manufacturer to determine if the heater is suitable for use with LP-Gas and get his recommended changeover procedure.

2. If the heater has an adjustable orifice, remove it and install a fixed orifice of the proper size for max-

imum, safe Btu input. This is important as in many cases the heaters may be undersized for the room and in an attempt to get more heat out of the unit, the owner may try to increase the heat output by changing the location of the adjusting screw, with possible formation of undesirable products of combustion.

3. If the heater has a pilot light, remove it and replace it with a full automatic safety pilot.

4. After changeover and adjustment, try out the heater in the shop to be sure of proper performance.

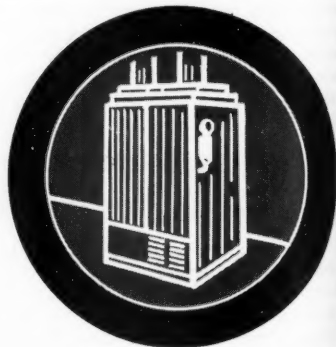
## CENTRAL HEATING

1. In central heating systems requiring duct work, the heater is usually installed by a heating contractor.

2. Before connecting up gas lines, check for the AGA approval label for liquefied petroleum gas.

3. Check the installation for proper vent pipe installation and downdraft diverter. No dampers should be installed in vent pipes.

4. Check for proper air circulation





and ventilation in the furnace room.

5. Make up connection solidly, installing an approved shutoff valve in the piping ahead of any control valves.

## FLOOR FURNACES

1. Check the building structure before cutting any floor joints or beams to prevent weakening of the building.

2. Where floor is close to the ground level and a pit is required, check for drainage and install necessary drainage diversion to prevent pit filling with water which may cause pilot or main burner to be submerged.

3. When a pit is necessary, it should be made so there is a minimum clearance of 6 inches from the bottom of the furnace and 12 inches on all sides, except the control side which should have 18 inches clearance.

4. Sides of pit should not be sloped at less than a 45° angle.

5. A trench the entire width of the pit from a point on ground level on the windward side of the house sloping to the bottom of the pit and up to ground level on the leeward side of

## INSTALLING APPLIANCES

the house, should be provided for cross ventilation.

6. The ventilation openings should be covered with a ½-in. screen and be so situated that they will remain open at all times.

7. All floor furnaces should be properly vented with a vent pipe having an area no less than the area of the vent collar in the heater.

8. Adequate provision shall be made for access to the furnace under the house by means of an opening in the foundation wall or through a trap door of at least 18 in. by 24 in., located at some point in the house, and a clear and unobstructed passage way to the furnace of a least 24 in. high by 24 in. wide.

9. Make up pipe connections solidly and install an approved shutoff valve ahead of the control valves.

10. When floor furnaces are installed in an upper floor, the furnace assembly should project below into a utility room, closet, garage or similar noninhabited place.

11. In such installations the furnace should be enclosed completely with a separate means of air intake from outside the house.

12. The enclosure should be constructed of Portland cement plaster on metal lath or material of equal fire resistance.

13. Clearance between the furnace and the enclosure of 6 in. on all sides and the bottom should be allowed.

## SPACE HEATERS

1. When a room heater is provided with a vent connection, install a proper vent. It is possible to safely operate heaters of fairly large Btu input unvented, but these heaters are de-

## INSTALLING APPLIANCES

signed for unvented operation. Often the requirement necessary for a successful unvented operation is not incorporated in a heater which was designed for vented operation.

2. Where portable room heaters are installed, an approved shutoff valve should be installed in the piping stub leading into the room which can be closed and capped if it is desired to remove the heater in the warm season.

3. Piping from the wall stub to the heater should be made up solidly, or an approved, seamless, copper tubing connector not over 6 ft. long may be used.

4. Rubber tubing and push-on connections should not be used with LP-Gas for room heater installations.

5. When automatic temperature control is desired, the room heater should be equipped with full automatic safety pilot and main burner shutoff controls.

6. When electric current is used for operation of controls, controls should be selected to shut off on power failure and require to be reset manually.

7. When open fire radiants are used, they should be located away from drapes, curtains and other flammable material.

## ADJUSTING, TESTING

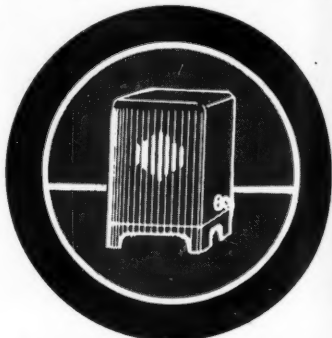
1. Central heating units should be thoroughly checked and tested. Due to the automatic control features, manufacturer's instructions should be followed carefully.

2. After checking all piping for leaks, the burner should be lighted and the air adjustment set and tightened in place when a proper flame has been obtained.

3. All controls, including automatic

fan stop and start controls and room thermostats, should be checked and serviced to insure proper functioning of unit.

4. Servicing should not be considered complete until every automatic



function has been tested out by actual operation, including shutting off the electrical supply while the furnace is running and turning it on again with various time elements between the shutoff and turn-on to see that all safety features operate.

### Adjust Heaters in Shop

5. Portable room heaters should be serviced and adjusted in the shop to minimize time required on the job.

6. After installation and checking piping for leaks, portable units should be lighted and operated and allowed to come up to full temperature to check flame and pilot operation in the installed location.

7. After heating equipment is in good operating condition, the owner or occupant should be instructed in the method of operation and be allowed to witness the function of the automatic devices. The user should be taught how to relight the heater by actually having him do so a number of times.

## HOUSE PIPING

A good job of house piping can be done just as fast and economically as a poor one. Do a good job the first time and insure a safe installation.

In many areas the house piping is done by contractors and plumbers. Acquaint the local contractors with the requirements of a good piping job for LP-Gas. A good plumber or gas fitter can do a good job of piping. There are only two things he needs to know. One is the need for using a special joint compound for LP-Gas and the other, the need to keep the inside of the pipe clean due to the trouble from dust that can be experienced because of the small size orifices used on high Btu gas.

A condensed version of house piping requirements for LP-Gas that has been under consideration by a special committee of the LPGA follows:

1. All piping or tubing for conveying gas on the low pressure side of the regulator shall be suitable for a safe working pressure of not less than 125 psi.

2. Piping shall be wrought iron, steel (either black or galvanized), brass or copper pipe or other approved nonferrous tubing. Aluminum tubing is not to be used for exterior location, nor where it passes through masonry or plaster walls or insulation. All iron or steel pipe shall comply with the requirements of ASTM Specifications A-120-44. Copper tubing may be either Grade "K" or Grade "L".

3. Pipe joints may be screwed, flanged or welded. Joints in copper or other nonferrous tubing shall be flare or compression type. Where compounds or "dope" are used in making

## INSTALLING APPLIANCES

up joints, they should be resistant to the actions of the gas to be used.

4. Screw fittings for use with wrought iron or steel pipe shall be either malleable iron or steel. The use of cast iron fittings is not allowed. Where fittings are used, they shall have a working pressure of not less than 125 psi where the operating pressure is less than 125 lbs. Where the operating pressure exceeds 125 lbs., extra heavy malleable iron or steel fittings shall be used.

5. Valves for piping shall be of an approved type suitable for use with liquefied petroleum gas. Valve seat material, packing gaskets, etc., shall be of a type resistant to the action of liquefied petroleum gases in the liquid phase. Every valve or gas cock shall be readily accessible for operation or repair.

6. Gas appliances burning not more than 90 cu. ft. per hour may be connected with seamless metal tubing connectors meeting the following requirements.

- a. End fittings shall be screw type or union type permanently attached.

- b. The method of attaching such tubing connectors to the house piping and the gas appliance shall not depend upon separate ferrules, washers, gaskets or other detachable parts for gas tightness, nor shall such separate parts be used to establish and maintain the methods of seal provided within the connector and fittings.

- c. The over-all length of such tubing connectors shall not exceed 6 ft.

- d. No part of such tubing connector shall be concealed within or run through any wall or partition.

- e. Each such connector shall bear



the seal or insignia showing that it complies with the approval requirements for the construction, material and specifications of such tubing connectors of the American Gas Assn., or other nationally recognized standards.

(Table 2 shows recommended pipe sizes for low pressure house piping.)

## PIPING INSTALLATIONS

1. All piping installations shall make provision for expansion, contraction, vibration, and for settling to insure that the system remains gas tight.

2. Horizontal or vertical runs of piping shall be supported by hangers or suitable clamps in accordance with the following table:

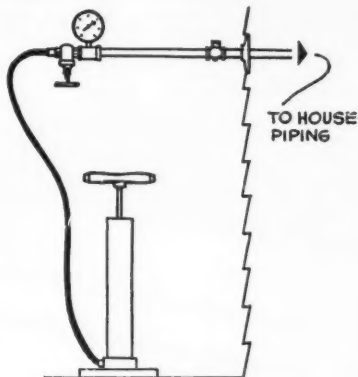
Size of Pipe	Spacing of Supports
$\frac{1}{2}$ in. and smaller	6 ft.
$\frac{3}{4}$ in. to 1 in.	8 ft.
$1\frac{1}{4}$ in. and larger	10 ft.

3. Branch lines shall be installed so as to come out the side or top of running lines, and not from the bottom.

4. Piping outside of buildings may be installed underground (if underground, they should be placed below frost level) or aboveground and suitably protected against mechanical injury by means of curbs, slabs or other suitable means. Underground butane or butane-propane mixture line should have adequate drainage to suitable condensate trap to guard against gas obstructions.

5. Where risers are placed outside of building walls, they shall not be more than 4 in. from such wall, unless protected by a substantial post to prevent mechanical injury.

6. A shutoff valve shall be installed



Bicycle pump and gauge make simple the pressure testing of house piping.

ahead of each appliance if more than one appliance is connected to a single utilization equipment.

7. No person, firm or corporation, shall connect a liquefied petroleum gas container to any piping installation without having first determined that all piping of such installation complies with the rules and regulations relative to liquefied petroleum gas piping.

8. In gas connection for LP-Gas the compounds used in making up joints shall be resistant to the action of such gases.

9. Openings through floors for pipe risers should be at least  $\frac{1}{4}$  in. larger than outside pipe diameter to prevent moisture or dirt collection at such points.

10. Gas piping and tubing should be located at least 12 in. away from lightning rods, gutters, downspouts and other drains from the roofs or houses.

# TO KEEP

Use NBFU Pamphlet 58 and follow all existing laws and codes in your city and state.

Select only those systems and equipment approved by Underwriters' Laboratories, and appliances approved by AGA Testing Laboratories.

Educate consumers to a better understanding of the characteristics of the fuel and to more careful practices in operating their appliances.

Never To Cha



# PGAS SAFE

Teach all employees the fundamentals of safety and train them in every branch of plant operation, consumer installation and service, transportation of the fuel and storage.

Learn how to fight LP-Gas fires so, if they occur, or if there is an accident, you can protect company personnel, the user and his household, and the public.

Keep your plant clean.

er To Chances!

## ABOVEGROUND SYSTEMS

**B**ECAUSE consumer tanks are filled directly from delivery trucks, special care is taken to set them in a manner that insures safe liquid transfer. Recommendations of NBFU Pamphlet No. 58 specify correct equipment for both above ground and underground tank installations. Containers are manufactured according to standards set forth in codes prepared by ASME and API-ASME code-making committees.

1. Due to the size and permanence of the installation, careful consideration is given to the location of tanks to insure safety in filling and use.

2. Tanks are so positioned that the fill valve is easily accessible without the use of unusual lengths of hose from the delivery truck to eliminate the need of adding extra hose.

3. When a good access road is not available to the consumer's house, tanks are located on property readily accessible by trucks to prevent awkward and unsafe filling operations.

4. Tanks furnished are built according to codes recommended by the NBFU Pamphlet No. 58.

5. Tanks are placed on firm foundation to prevent movement and strain on yard piping.

6. Tanks are set level to insure correct gauging.

7. Tanks are set with filling connections located in the most desirable direction to reduce exposure to buildings or openings in buildings.

8. When tanks are located in areas used by vehicles, tanks and fittings are protected by guards or bumpers.

9. Fill connections and regulators are protected by guards or ventilated covers to prevent tampering.

10. Safety valve discharge is pointed vertically and is located so vapors can escape without impingement or deflection from guards or covers.

11. Pressure reducing regulators are set at tank whenever possible to reduce pressure on yard lines to prevent accumulation of drips in piping.

12. Before tanks are delivered to consumer premises, they are checked for dryness and if any moisture is present it is removed to prevent freeze-ups in regulators.

13. Before tanks are delivered they are tested for leaks in fittings to prevent need of making repairs at customer location.

14. Due to the weight of the tanks, special equipment for delivery and handling should be used.

15. Connections from tanks to house line inlets are buried at least 2 ft. below surface of the ground to prevent damage to the pipe due to gardening or weight of vehicles driving over lines.

16. Lines between tanks and houses can be of copper tubing or steel pipe, but if steel pipe is used it should be coated and wrapped.

17. Tanks are marked with flammable signs and customers are instructed to keep area around tank clear of rubbish, dry weeds or other material that is readily ignitable, to prevent damage by fire.

18. Tanks are painted a light color.

## UNDERGROUND TANKS

**B**ECAUSE underground tanks cannot be visually inspected after they are covered, it is a special problem for installers to see they are well protected against damage.

1. To make certain that the protective coating is not damaged, particular care is taken in handling underground storage tanks. A small bare spot will start excessive corrosion.

2. The first step in determining upon a site for an underground tank is to locate active or abandoned house drains, sewer mains and water mains. The tank should not be buried near such underground piping because leakage from the tank or fittings could follow such piping into the building.

3. All tanks are inspected and tested for leaks at the fittings before they are moved to consumer premises.

4. Place fittings guards on tanks as the first step in handling them. The guard is not taken off until the tank is securely placed in final installation position. It is part of the job to transport tanks without damaging fittings.

5. If the tank is carried by truck, lash it to the truck body. To further secure the tank from slipping while in transit, wooden blocks are placed against it.

6. An overlay of all underground piping and septic tanks is examined before the LP-Gas storage site is selected. A place for the tank should also be marked with regard to providing future extensions on buildings.

7. All LP-Gas installations should be made within reach of a driveway that will withstand the weight of a delivery truck under any weather conditions.

8. If it is absolutely necessary to make an underground installation in corrosive ground, a sufficient quantity of lime chips to counteract it are placed in the hole. Corrosion can cause leaks in LP-Gas tanks and connections.

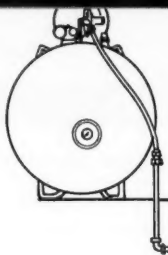
9. If it is necessary to locate the tank in ground subject to a high water table, the plant is anchored with concrete. Because tank movement may break connections, the weight is used to prevent the system from floating.

10. Firm foundations are provided for tanks by tamping the surrounding soft earth or sand. Five or 6 in. of sand are also placed and tamped in the bottom of the hole upon which the tank will rest. As well as providing a solid base for the tank, it helps reduce corrosion.

11. The tank may be lowered into the hole by crane. Trailers especially built to haul tanks are usually equipped with block and tackle to lower the tank. The unit is pulled right over the hole into which the tank is to be lowered.

12. If, when making an installation, the job cannot be completed in the same day, the hole is covered with lumber. Also, consumers are warned of the existence of the hole to reduce danger of anyone falling into it.

13. Fine, loose dirt is thrown in first when filling the hole. This is done to avoid knocking protective coating off the tank with larger chunks of dirt.



## INSTALLING THE YARD LINE

1. Piping, fittings, and valves are of the type approved for use with LP-Gases. Wrought iron, steel, brass or copper pipe is used.

2. To withstand the pressure equivalent to the working pressure of the tank, piping and fittings are extra heavy up to the first pressure-reducing valves. All piping, however, is suitable for a working pressure of not less than 125 psi.

3. All screwed joints are made up tight and a joint compound that is insoluble in LP-Gas is used. The compound helps to make a perfect seal, but it does not set permanently. This makes it possible to remove valves or fittings at any time.

4. Underground lines between the container and the building are installed below the established frost line and in no case less than 2 ft. below the ground level.

5. In extremely cold climates, or in

areas where butane is used exclusively, a drip pocket is placed in yard lines. It is installed at the lowest point in the line and all piping is given a 1-in. to 10-ft. grade to that point to take care of any condensate that may form in the lines.

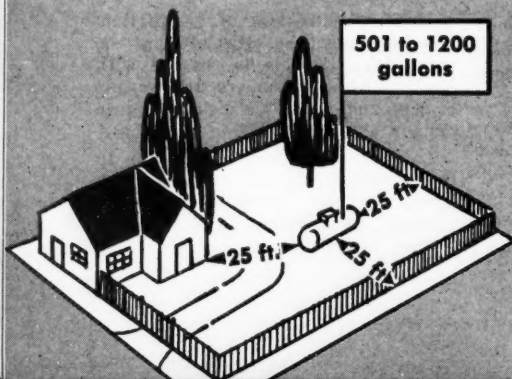
6. Underground steel piping is protected from corrosion by coating with protective materials and care is used to prevent damage to the coating when back-filling the ditch.

7. Bends or swing connections are used between the buried pipe and the tank and to the house connection to prevent damage due to settlement.

8. Shutoff valve is installed at the entrance to the building to facilitate tests on the buried pipe.

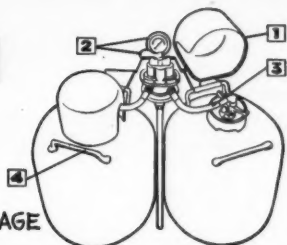
9. Yard piping is located in such a manner that it will not be subjected to damage from heavy loads crossing it or from the use of cultivating tools.

**501 to 1200  
gallons**



**FUEL CONTAINERS AND FIRST  
STAGE REGULATING EQUIPMENT  
SHALL BE LOCATED OUTSIDE  
OF BUILDINGS IN ACCORDANCE  
WITH THE FOLLOWING TABLE**

## SELF-SERVICE UNITS



1. GUARD 2. SERVICE GAUGE AND CHANGEOVER LEVER  
3. WORKMANLIKE CONNECTING LINES & FITTINGS 4. HANDLES

1. All cylinders are built and maintained according to ICC regulations so it is possible to ship them to a refilling plant.

2. Cylinder valves are protected by a nondetachable guard or cap to insure that valves are protected while being installed by the consumer.

3. Cylinders are equipped with handles to reduce the possibility of injury to customers while handling.

4. Suitable installation brackets are provided to insure proper location and setting of cylinders at point of use.

5. Cylinder connections are simple and provided with wing nuts or other means to make connections without the use of tools or wrenches to prevent damage to the regulators or pig-tails which might result from the use of tools by inexperienced hands.

6. Cylinder changeover control regulators have positive shutoff feature

to prevent any escape of gas when empty cylinder is disconnected.

7. System is equipped with service gauge to indicate which cylinder is taking the load so consumer is able to determine the cylinder to change.

8. Excess flow valves are incorporated in the wing nut connection to prevent escape of gas due to accidental breakage of the hose or pig-tail connection.

9. Cylinder shutoff valves are automatic to shut gas off when disconnected to eliminate the need of the customer closing the valve by hand.

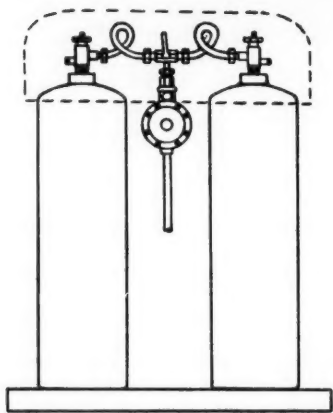
10. Cylinder valves are equipped with caps chained to the outlet to provide a means to insure positive shutoff while cylinder is out of service or being transported.

11. Cylinders are equipped with either safety relief valves or fuse plugs to prevent rupture due to over-filling or fire exposure.

## SAFE DISTANCES

	MINIMUM DISTANCE FROM BUILDING		DISTANCE BETWEEN ABOVEGROUND CONTAINERS
	UNDERGROUND CONTAINERS	ABOVEGROUND CONTAINERS	
Less than 125 gals. ....	10 ft.	None*	None
125 to 500 gals. ....	10 ft.	10 ft.	3 ft.
501 to 1200 gals. ....	25 ft.	25 ft.	3 ft.
Over 1200 gals. ....	50 ft.	50 ft.	5 ft.

\*WHEN CONTAINERS ARE FILLED ON THE PREMISES MINIMUM DISTANCE FROM BUILDING IS 10 FT. TO THE FILL VALVE.



## CYLINDERS

**T**HIS method of distribution and use has gained its great popularity because of the simplicity and safety of the operation and because it amply covers the needs of many users beyond the reach of the piped gas systems for a supply of gaseous fuels.

1. Cylinders are located in a place that is easily accessible.
2. Cylinders are installed on a firm, level foundation to prevent damage.
3. Regulator and manifold are firmly supported on brackets or from wall of building.
4. Location of cylinders with relation to windows, doors or other openings in the house, are governed by the recommendations of NBFU Pamphlet No. 58, which require a horizontal distance of 5 ft. from any opening below the safety valve outlet.

5. Cylinders are located in a position that is safe from accidental damage from vehicles, and if located in driveways or alleys, they are protected by substantial guards to prevent damage to cylinder and installation.

6. Connections between the cylinders and regulator on house piping is made with flexible copper tubing "pigtailed" to facilitate the changing of cylinders without putting undue strains on the pipe and fittings.

7. Pigtailed are factory made with proper connectors permanently attached to the tubing.

8. A regulator is always installed between the cylinder and house piping.

9. Pressure regulators are equipped with a safety relief on the downstream side to prevent build-up of unsafe pressure on the appliance lines.

10. A shutoff valve is installed in the house line pipe in a convenient and accessible position.

11. When installations are made in public places, such as school grounds, cylinder valves, regulators and equipment are protected by properly ventilated hoods or cabinets.

12. To prevent damage to cylinders and equipment from fire, rubbish, dry weeds and other flammable materials are not allowed to accumulate around the installation.

13. When it is necessary to install the pressure regulator inside of a building, provision is made to pipe the outlet of the relief valve to a point outside the building 5 ft. away from windows or openings into the house.

14. Vent lines from regulators are protected from stoppage by fitting outlet with bug screens and rain deflectors.

15. When possible, regulators are set to allow free drainage back to cylinder.

## AGRICULTURAL



**I**NASMUCH as the handling of the fuel and the servicing of equipment is out of the hands of the fuel supplier after the delivery is made to the central tank, the equipment furnished is required to be convenient and safe to use.

1. The main storage tank is located in clear area with good access road for delivery truck and farm equipment.

2. Where the tank is used to transfer fuel into mobile farm equipment, proper connections are installed to allow for vapor return when the liquid transfer is being made.

3. A mechanical or hand pump, specially designed and built for LP-Gas service, is installed.

4. A sign is installed in a position that can be plainly seen, advising operators to stop engines while refueling to eliminate source of ignition in case of a leak.

5. Skid tanks are built with proper rails and guards to prevent damage to tanks and fittings while being transported and handled.

6. Supply lines to buildings are connected to outlet in vapor space in tank which is used for no other purpose. This prevents chance of interference with domestic and farm building supply while other transfer operations are being made.

7. Pressure to building lines is reduced at the tank by a regulator. This also prevents condensate formation in the lines.

8. Lines are buried 2 ft., or more, to prevent damage from farm equipment or trucks.

9. When trap wagons are used, care is taken to prevent accumulation of greases, oil and rags to prevent causes of exposure to the LP-Gas tanks and fittings in case of a fire from that source.

10. Good hoses and connections approved for use with LP-Gas are used to transfer the fuel to prevent accidents due to the use of makeshift transfer lines.

11. A clear space or open-ended shed is used to store LP-Gas equipped farm machinery and field and skid tanks when they are not in use.

12. Where steam generators or hot water heaters are installed for sterilizing, full safety pilot and burner controls are installed to prevent accumulation of gas in case of temporary outage and subsequent turn-on.

13. Yard lines are sized large enough to allow an even pressure to the utilization equipment on full load to prevent pilot light failures.

14. Piping, regulators, and hoses on the main tank are protected from damage from mobile equipment by guards or crash rails to prevent accidents from skidding or handling of equipment by inexperienced hands.

15. Farm operators are advised concerning the proper methods of handling LP-Gas, its general characteristics, the codes and requirements governing installations and use, to help prevent accidents due to lack of information on the product and equipment.



## COMMERCIAL



**T**HE commercial installation is one that is commonly installed by the LP-Gas operator and serves such establishments as auto courts, restaurants, bakeries, shops, resorts, and other medium size operations where there are employees who control the use of the gas.

These installations are numerous and, though similar to large domestic installations, require a few special considerations.

1. Tank location is given extra consideration with respect to the operations of the establishment such as storage of crates and refuse, operation of trucks, incineration of waste, and customer use of driveways or parking spaces, to reduce the hazard of accident to the installation.

2. If necessary, guard rails or other protection are installed to prevent damage to the tanks and regulator.

3. Tank and regulator sizing is given careful consideration to prevent low pressure or outage at the appliances due to overload on the system.

4. Piping is sized sufficiently large and is located so it will not be damaged by the operations of the user or his customers.

5. When wide variations between low load and peak operations are encountered, multiple regulator installations are made so both load conditions can be satisfactorily met.

6. Where appliances are operated by transients, they are installed so as

to be easy to turn on and off, and positive venting or ventilation is provided to prevent accidents due to unfamiliarity with gas fuel.

7. Where vaporizers are used, provision is made for liquid level control to prevent flow of liquid into gas piping in case of overload or loss of heat supply to the vaporizer.

8. Where special equipment is used in the system that requires attention from the user or his employees, it is installed in such a way that it can be easily operated and simple instruction sheets are provided to guide the person making adjustments to insure consistent and safe operation.

9. If it is necessary to make the installation in a location accessible to children, such as a school or playground, proper fencing or other precautions are taken to prevent tampering with the valves or equipment.

10. Where operators require gas at pressures over the standard low pressure normally used, separate lines are run for the high pressure gas or proper regulators are installed outside of the buildings to furnish low pressure gas supply for ordinary appliances to prevent chance of overpressuring standard equipment.

11. All automatic burner equipment is provided with 100% pilot and main burner shutoff controls to prevent flash backs or fire box explosions.

12. In operations where flexible hose is required such as irons, torches, etc., a positive shutoff valve is installed in the line at the hose connection to allow gas to be shut off ahead of hose when not in use.



# GET BACK ON THE HI-WAY TO SALES

## WITH THE **NEW** BROWN HI-BROILER RANGE

**Two oven capacity — Broils and bakes at the same time.**

The shimmering beauty of the new 1949 Brown Gas Range attracts men and women alike. Its quality construction features sell them, and its price tag closes the deal.

Especially suited to LP selling conditions, the new Brown two-oven capacity range has extra large oven 16" x 20" x 15" high. The broiler is separately controlled, and is located where 90 per cent of the women like it—waist high.

**SO MUCH STOVE for so little money!**

- \* One piece divided top
- \* Stainless steel Burner Grates
- \* Aluminum alloy burner heads
- \* One piece tank type welded oven
- \* Smokeless Broiler, three positions
- \* Broiler lifts out for easy cleaning
- \* Fiberglass 2 inch insulation
- \* Automatic top lighting
- \* Fully porcelain enameled, acid-resisting top
- \* Individual burner wells
- \* Fully approved by AGA for LP-Gas
- \* Two giant and two regular burners

Shown below is the popular, fast-selling, Brown Apartment Range. It has all the selling features above, except for storage space: White porcelain overall with gleaming chrome trim, two giant burners and two regular burners, roller bearing pull out broiler and full-sized oven.



### 6 New Models— Everyone A Beauty

Also available for immediate shipment are the Brown Standard range with Lo-Broiler, the Deluxe with "Windoor" and electric lighted oven, an economy black porcelain trimmed apartment range, and several other variations. Send now for complete catalog, and details about dealer sales aids.



**Write today  
for complete  
dealer details**



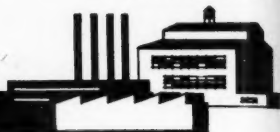
Buy direct if there is no distributor near you. Distributorships open in the Western States. Retail dealerships available in many parts of the United States.



**BROWN STOVE WORKS, INC.**  
CLEVELAND, TENNESSEE

Brown Stove Works, Inc.  
Dept. LP 149, Cleveland, Tenn.  
Please rush complete details about your new line of LP Gas Ranges.  
Name \_\_\_\_\_  
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City \_\_\_\_\_ State \_\_\_\_\_

## INDUSTRIAL



**T**HE usual industrial installation is one that requires not only the LP-Gas dealer's knowledge but also that of a competent engineer.

1. Study of the load requirement is made to determine the size of the tanks and vaporizing equipment to assure a sufficient supply to prevent fuel outages.
2. Where the LP-Gas is to be used interchangeably with other fuels, a complete check is made of the burner equipment and its adaptability to the use of LP-Gas.
3. Where it is necessary to provide an air-gas mixture, equipment is selected and installed to hold a constant specific gravity or Btu value.
4. Check is made of location of burners and utilization equipment to see that there is bottom ventilation.
5. Tanks are selected according to the fuel to be handled and are designed and built according to the governing codes.
6. Heat exchangers and vaporizers are selected for the load requirements and, if direct fired, are located in a safe location with respect to the tank filling connections.
7. Due to the large size of the possible industrial storage installations and the relative congestion, suitable fire prevention equipment is provided in the form of permanent water spray installations and dry powder chemical protection.
8. Care is taken in the selection of location of the storage to reduce the exposure of the tanks from possible sources of fires.
9. Where the hazard of shutoff of fuel to the end use dictates, special automatic, positive shutoff valves are used in lieu of excess flow valves to comply with the regulations without introducing undue hazards.
10. Liquid or high pressure piping is of welded construction as far as possible.
11. All fittings, valves, and appurtenances are selected to amply withstand the pressures encountered at possible elevated temperatures.
12. LP-Gas storage, mixing, and regulating equipment is fenced in.
13. Care is taken in the location of safety valve discharges and bleeding and venting discharges to prevent any discharged gases collecting or getting to possible points of ignition.
14. On air-mix plants, positive means are provided to prevent air introduction into the plant piping in case of a shutoff of the LP-Gas supply, or in the starting operations.
15. Positive means are provided to prevent LP-Gas backing into air receivers of air compressors.
16. Where electric or other automatic controls are used, they are designed to go into the position that shuts down the plant in case of failure of the energy supply.
17. Automatic controls are selected that require manual reset after plant shut-down.

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News



APPROVED EQUIPMENT  
+ TRAINED OPERATION  
= SAFE TRANSFER

# CARE IN UNLOADING MAKES DELIVERY SAFE

**W**HEN LP-Gas is in a proper container, it is safe. When it is withdrawn from the container under control for use, it is safe. When it is being transferred from one container to another in full compliance with the regulations, it is safe. But occasionally there is an accident.

Accidents happen in every industry.

What causes accidents in the LP-Gas filling operation and how can they be better controlled?

In reviewing accidents that have occurred in the past years, it has been found that most of the ones occurring on the customer's premises, caused directly or indirectly from the transfer of fuel from the truck into the consumer's tanks, were avoidable.

Further, the requirements to have avoided these accidents were so simple that, due to their simplicity, they were not followed.

Several accidents that have occurred are given below, as examples of what can happen—explaining the accident, the cause, and the way it could have been avoided. Accident-free deliveries are dependent upon use of proper equipment by drivers who have been instructed as to why safety rules, simple as they may seem, are necessary in our operations.

**The Accident:** Truck breaking loose while hose is connected to tanks. **Cause:** The emergency brake on the truck did not hold, due to vibration of the engine while pumping, or the truck started to slide down a hill due to ice on the pavement. **Prevention:** If truck had been equipped with permanently attached wheel blocks and they had been used, this accident and a number similar to it would not have happened.

**Accident:** Driver driving away with hose connected to tank. **Cause:** The driver just finished

## CONSUMER DELIVERIES

filling tank and before disconnecting was interrupted by the user to adjust an appliance. Came out another door, got into his truck and drove away; or, driver finished filling tank and a neighbor called him over to look at a place for a new installation. Took the order and sold an appliance, walked through the neighbor's yard and got into truck and drove off. Prevention: Distraction of an operator from a routine is a major cause of accidents in all industries. Both of these accidents could have been prevented if wheel blocks had been permanently attached to truck on both sides and driver had been used to the routine of walking around the truck to take out wheel blocks before driving off. If wheel blocks had been used, even though on a level road, driver would have killed engine when trying to start and would have noticed connected hose when moving blocks.

### Needed Bleeder Valve

Accident: Stuck fill valve in tank. Holding open after hose has been disconnected. Cause: Driver finished filling tank. No bleeder valve on filling connection so loosened acme thread on connector to bleed down. Turned connector too far and thread broke off. Escaping gas ignited before he was able to get the valve capped. Prevention: Accident could have been prevented if the operator had properly equipped his hose connectors with a bleeder valve and it had been used. The stuck valve would have been detected and escape of gas could have been prevented.

Accident: Stuck fill valve in tank before connecting. Cause: Driver removed cap from fill valve and liquid came out and ignited from nearby boiler. Prevention: Investigation indicated that small pieces of gravel had gotten into the fill valve before the cap was screwed on. A piece of gravel lodged in the fill valve, holding both valve and secondary check open. Accident could have been prevented if driver had checked for nearby open flame.

### Use Simple Precautions

From the above it can be seen that it is the simple precaution that will prevent accidents. Accidents at the consumer's premises are especially to be avoided by the industry for several reasons.

1. Any accident or near accident, large or small, that occurs on delivery route has a tendency to hurt the industry as a whole as well as the individual operator. Untrue and unfavorable publicity has been a major factor in causing restrictive legislation and unwarranted insurance rates.

2. Accidents at the consumer premises often result in property loss, insurance claims and litigation. None of these is desirable for the dealer or the industry, and the action of one careless operator affects the entire industry indirectly.

The equipment needed for safe filling operations is available. Safe methods of operation have been worked out. As a refresher, check over the following recommended routine.

## FILLING CONSUMER TANKS . . .

**T**HE delivery truck man is in a position, by his experience and familiarity with the product, to improve the industry's standing, and operators who desire to raise the standards of the industry make it mandatory that their truck driver salesmen conform to standard practices and are qualified to answer questions asked by the public.

1. Truck is parked in a location within easy hose reach of the tank, motor is shut off and wheel blocks set in place to make vehicle secure.

2. Driver makes quick, visual check of immediate surroundings for rubbish fires or other unusual situation.

3. Driver checks consumer tank gauge to estimate approximate delivery. If tank is found empty, outlet valve on tank is closed to prevent gas going into house piping before check is made as to open burners.

4. Liquid and vapor return hose connections are made to tank, and hose valves opened slowly to prevent excess flow valve from closing.

5. Connections are checked for tightness and if any leaks are evident, hose valves are closed and connections tightened, or remade, to prevent leakage of fuel at tank.

6. When connections are secure at customer tank, driver returns to truck, opens liquid and vapor return valves on truck slowly, starts motor, engages power take-off to start pump, regulates engine speed for proper pumping rate, and returns to customer tank to watch gauge to prevent overfilling.

7. When gauge indicates that level for filling is being approached, driver starts to top off tank by gradually

pinching down on valve on hose and shuts valve completely when level is reached, closes vapor return valve, returns to truck and shuts off pump and motor, then shuts off vapor and liquid valves at truck to relieve hose of pumping pressure.

8. Driver returns to customer tank and opens bleeder valve between hose valve and tank connection before disconnecting hose coupling to check for leak in hose valve or tank valve.

9. If bleeder valve continues to blow, hose is not disconnected until source of pressure is found and corrected to prevent escape of uncontrolled gas to atmosphere.

10. When no pressure is indicated by bleeder valve, hoses are disconnected and caps replaced on tank connections and hoses reeled or racked on truck to prevent driving off with hoses hanging.

11. Driver makes out delivery ticket and presents to customer. If it is necessary to shut off house supply due to empty tank, driver checks all appliances in house, then opens tank valve to regulator, returns to house and lights pilot lights, if any, to prevent possible hazard in house due to escaping gas.

12. If consumer is not at home, driver leaves note with delivery ticket advising that tank has been filled, that house line is shut off at tank and cautioning consumer to check appliances and pilots before turning on gas to prevent accidents in the house. This only applies if it was necessary to shut off fuel at time of filling.

13. Driver returns to truck and makes a complete circle around vehicle, removes wheel blocks and makes a visual check of hoses, valves, tool box cover, etc., to be sure truck is in fit condition for the road.

BELIEVE IT OR NOT, MR. DEALER...



## Furnace Sales are Warming Up ...with the Weather!

Hammers and saws and furnace installations in new home construction are going at a great pace this spring. Alert dealers who tell Contractors and Builders the story of WARCO low-cost heating are cashing in on this booming market.

P. S. If you are not a WARD dealer it will pay you to write us today.

Dealers will sell more than a million heating units in the new home construction field in 1949. The big demand is for quality installations that meet the requirements of competitive bidding and low budgets. • **WARD DEALERS** are beating the competition with **WARCO** Furnaces that provide plenty of heat and luxury features at the lowest comparative cost.



**WARD HEATER COMPANY • 1800 WEST WASHINGTON BLVD. • LOS ANGELES 7, CALIF.**

JUNE — 1949



## COMMERCIAL AND INDUSTRIAL DELIVERIES

**I**N ADDITION to the usual precautions used in making a delivery to a domestic installation due to the varied nature of industrial and commercial uses, additional steps to assure safe deliveries are advisable.

1. When truck unloading spot is located where normal plant traffic is accustomed to travel, detour signs or road blocked signs are set out to prevent passage or collision from plant vehicle.

2. Before making fuel transfer, plant employee in charge is consulted as to readiness for delivery to prevent possible interference to plant operations.

3. Where open fire operations are going on in the near vicinity, operators are alerted that fuel transfer is about to be made so precaution can be taken in event of an accidental fuel spill.

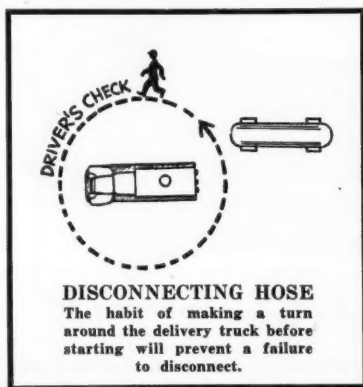
4. When deliveries are made to

roadside businesses where there is liable to be customer traffic, truck is parked in the clear and, if necessary, warning signs or barricades are placed to prevent collisions or other accidents.

5. When dry hoses are used for transfer, care is taken to blow down hoses through vent line to safety valve stack or to some place in the open and any remaining liquid in the hose is carefully dispersed to prevent possible flash from uncontrollable sources of ignition.

6. Where water heaters or steam boilers used for heating vaporizers are located close to the unloading operation, doors are closed and kept closed until operations have been completed to prevent any possible accumulation of dispersed gas.

7. After filling operation has been completed, all plant filling connections are capped or plugged to prevent leakage through valves.





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**REZNOR**  
*gas fired unit heaters*



SUSPENDED  
OR  
FLOOR TYPE

**EXTRA PROFITS**

Each Reznor heater gives air circulation in summer—auto-  
matic gas heat in winter. You can sell this 2 in 1 package  
in summer. Summer sales often mean extra sales . . . you  
avoid fall rush . . . you keep your men busy in off-season.  
More Reznors in use than any other. Catalog shows extra  
features . . . write today.

**REZNOR MANUFACTURING CO.**  
**4 UNION ST. • MERCER, PENNA.**

## CONSUMER DELIVERIES

### CHANGING CYLINDERS

**C**YLINDER installations vary from a single cylinder setup to a multiple bank for larger users, and the sizes of cylinders vary from 60 to 200-lb. capacity, but the most common size is the 100-lb. container that weighs about 190 lbs. when full.

1. Before disconnecting a cylinder from the house line or manifold, the cylinder valve is closed.

2. The cylinder valve connection is disconnected slowly, allowing pressure to bleed down before entirely removing nut. If pressure does not reduce, the cause of leakage is checked and, if necessary, the other cylinders are shut off to prevent escape of high pressure gas.

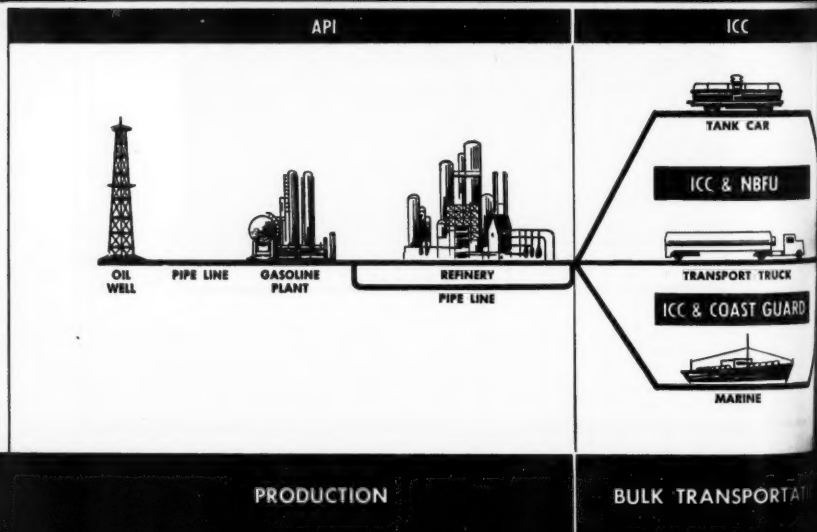
3. If it becomes necessary to shut off entire gas supply to house line, as when changing a single cylinder setup or due to need to repair or replace a regulator or changeover valve, gas is not turned into house line until all appliance burners have been checked and burner valves turned off.

4. If customer is not at home when it has been necessary to shut off gas to house line, a card or note is left advising that full tanks have been delivered and gas is shut off at tanks, and instructing customer to check burners and pilot lights before turning on gas.

5. Proper wrenches to fit cylinder valve connections are furnished and used.

6. Cylinder valve connection is examined for condition of threads, and

## SAFETY STANDARDS GUIDE THE FLOW OF LIQUID



## CONSUMER DELIVERIES

dirt, if any, removed from tank valve.

7. After full tank has been set and connections made, tank valve is opened and connections are checked for leaks.

8. Protector cap is placed on empty tank to protect valves in transit.

9. Cylinders are rugged and built to safely handle the gas under pressure but they are not dropped or thrown from truck but are eased to the ground or lowered onto shock pads or mats.

10. When delivery truck cannot closely approach cylinder installation, hand trucks are used to carry the cylinders over lawns or rough ground.

11. In case the relief valve starts to open on a cylinder when being transported or set, the cylinder is moved to a clear space and vented until the pressure is lowered and returned to the plant for check up and repair.

12. Cylinders are set plumb and square, and when hoods or cabinets

are used the doors are closed or hood set in place and secured.

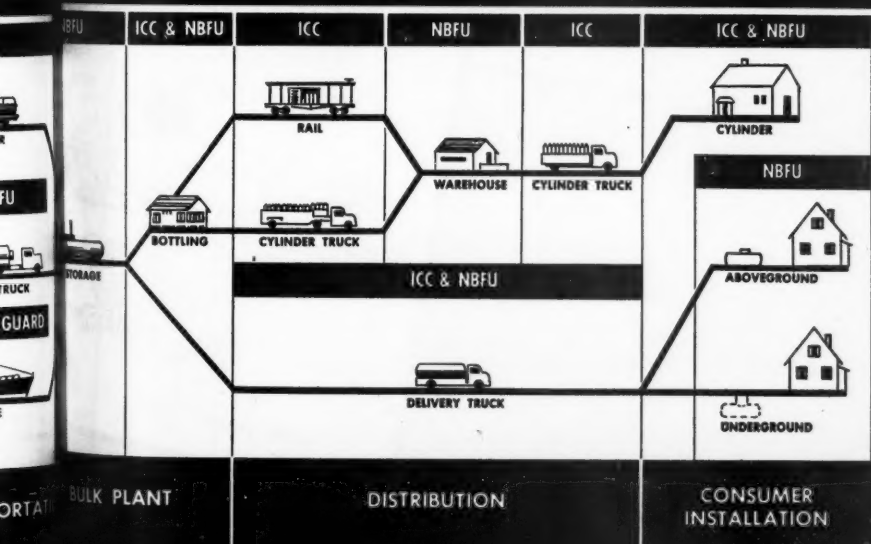
13. Each time a cylinder is delivered, driver makes a check of condition of equipment, regulator, pigtailed and immediate surroundings, and if rubbish or flammable material has been allowed to accumulate near the installation, he notifies customer to clean up the premises.

14. Delivery men are well trained in gas appliance service operations and perform necessary minor adjustments to customer appliances.

15. Drivers carry test equipment and if they receive a consumer complaint of gas smell, a pressure test is put on house lines and appliance burner valves to locate leaks, if any, and gas is not turned into house lines until trouble, if any, has been remedied.

16. Full and empty cylinders are loaded and carried on trucks in secure position and held by chains or other means.

## PETROLEUM GAS FROM SOURCE TO CONSUMER



## INSTALLING APPLIANCES



see page 70

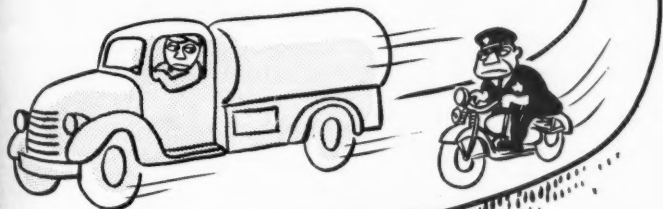
## CONSUMER DELIVERIES



see page 106

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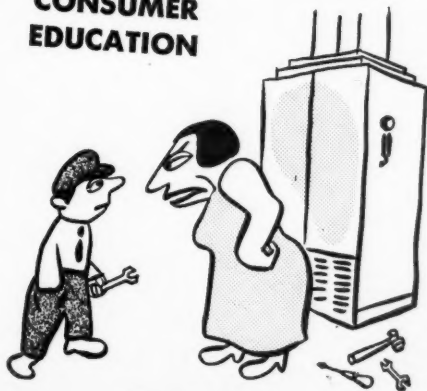
## GOOD HIGHWAY HABITS



see page 118

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## CONSUMER EDUCATION

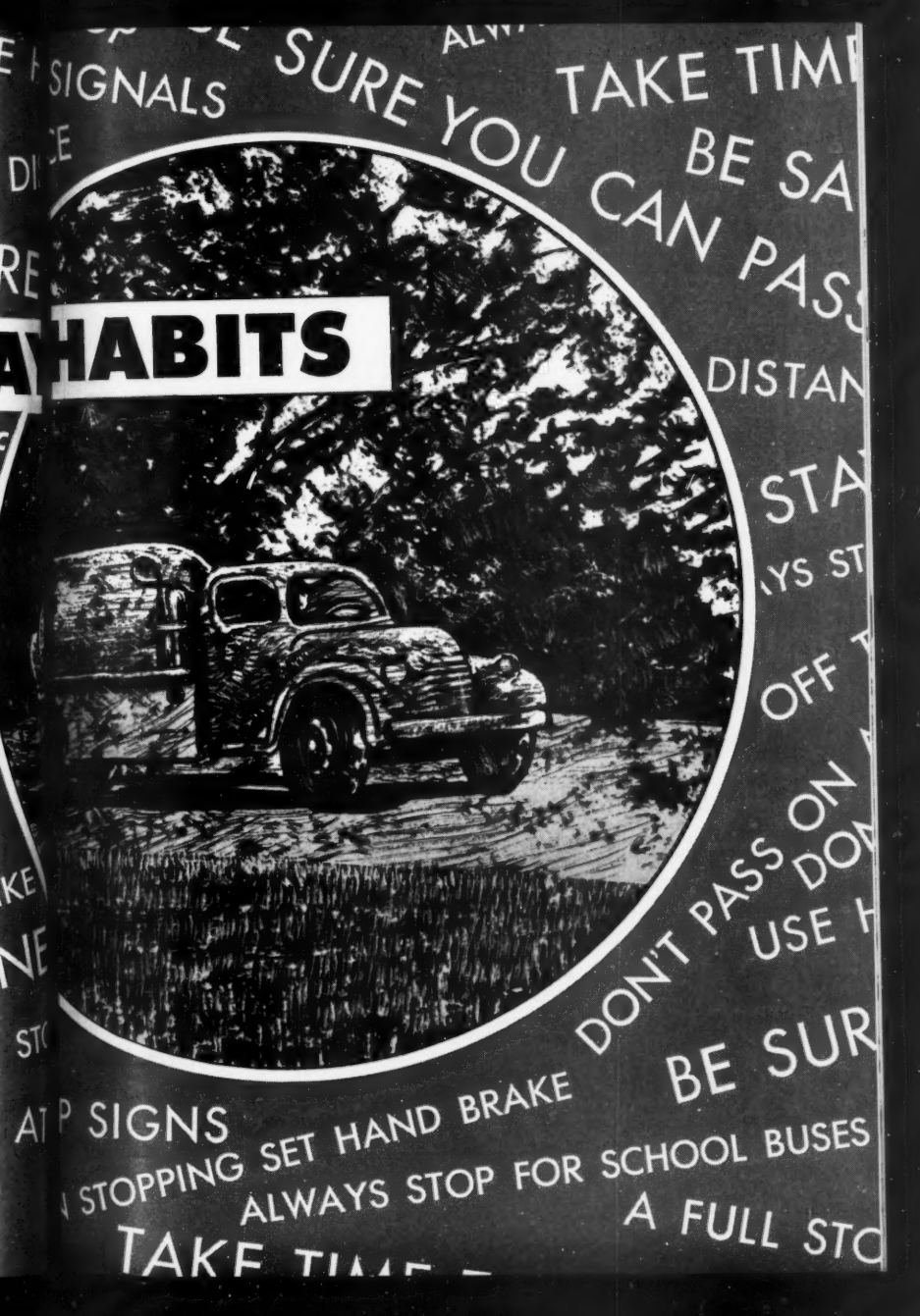


see page 163

# GOOD HIGHWAY

The highway is alive with potential hazard. The "other driver" is forever doing the unexpected.

Transporters of LP-Gas have an equal obligation to the public and to the employer. Well designed, well maintained equipment and good driving habits will hold down accidents.



# HABITS

SIGNALS SURE YOU TAKE TIME  
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STOPPING SET HAND BRAKE  
ALWAYS STOP FOR  
TAKE TIME



# NOW READY!

## 12 DIFFERENT BOOKLETS

*A Collection of the Best Articles from  
Ten Years of BUTANE-PROPANE News  
Reprinted by Subject in Handy Booklets  
for Instruction or Reference*

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Building a Bulk Plant for Speed and Safety—Accurate Metering—Transfer of LP-Gases—Pump Hook-Ups—Engine in Place of Electric Motor for Transfer—Measuring Liquid in Tanks—Safety Recommendations.

### No. 3 FUEL AND UNLOADING WITH PUMPS AND COMPRESSORS

Unloading Tank Cars—Tank Truck Installations—Bulk Plant Design—Important Installation Features—Four Services with One Pump—Determining Vapors in Tank Cars—Compressor Fundamentals.

### No. 4 SERVICING DOMESTIC APPLIANCES

General Principles of Gas Utilization—Range Servicing—Water Heater, Space Heating Servicing—Meters, Regulators and Related Pipe Fittings—Gas Refrigeration—Appliance Changeovers.

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## BUTANE-PROPANE NEWS

198 South Alvarado Street  
Los Angeles 4, California

**Headquarters for LP-Gas  
Information Since 1931**



# SAFE RULES FOR SAFE DRIVING

If you are in the LP-Gas business you are in the trucking business. A large part of the cost of doing business is the cost of operation of the delivery equipment, drivers' wages, and insurance on truck equipment.

The trucking industry is one of the largest industries in the United States and employs more labor than any other industry.

The truck is on the road and subject to the hazards of the other driver that cannot be definitely controlled, but alertness and good judgement will help a trucker protect himself from the other driver.

The truck design should be such that it can take a rear end, a front end, side swipe or collision or turnover without damaging the piping or fittings. The tank is heavy

A good driver will avoid accidents by being alert and ready for the other driver's erratic operation,



**LEFT TURNS**

but if he has to have a collision, he will attempt to take it where it will hurt the least. By being on the beam all of the time, many a potential accident can be avoided entirely.

The large highway truck operators have studied the causes and effects of road accidents and have made remarkable progress in cutting down the number and severity of truck accidents.

It is said that there are two kinds of drivers, "professionals" and "just drivers." When one of the latter type can exhibit an accident-free record he is usually just lucky. But the professional's good record is due to more than simple luck for the following reasons:

1. He knows what to do in any dangerous situation.



**ALIGHTING FROM VEHICLE**

enough to withstand more than normal collision impact.

# TRIMATIC PANELRAY\*

*Leads in low cost  
automatic heating*



Simply  
set dials for  
desired  
temperature

All controls  
enclosed behind  
doors—easily  
accessible

The Panelray infra-red ray wall heater is now available with full automatic temperature control, factory installed. All controls are included in the pipework assembly in the base of the heater, requiring no wiring or extra work during installation.

## **Here are the advantages of the TRIMATIC PANELRAY:**

1. Requires no wiring or installation of thermostat or parts.
2. All sizes of dual models may be automatic on both sides.
3. Safety pilot control feature is an integral part of each thermostat. (100% safety on heaters equipped for L. P. Gas.)
4. Closer maintenance of desired temperature.
5. Important new lower prices for automatic operation.

**SELL TRIMATIC PANELRAY**

**DAY & NIGHT**

DAY & NIGHT MANUFACTURING CO., MONROVIA, CALIF.

# BRAKING DISTANCES

*MORE SPEED REQUIRES  
MORE STOPPING DISTANCE*

**20**

**MILES  
PER HOUR**

← 58' →



**30**

**MILES  
PER HOUR**

← 110' →



**40**

**MILES  
PER HOUR**

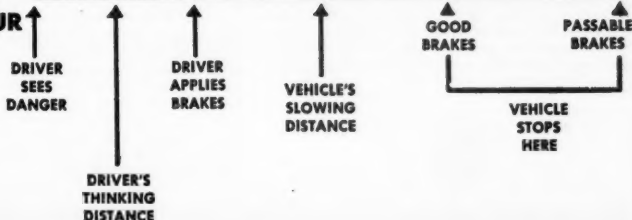
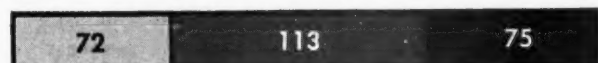
← 177' →



**50**

**MILES  
PER HOUR**

← 260' →



# AMERICAN-Standard

First in heating ... first in plumbing

## Gas Fired *Seneca* Winter Air Conditioner



DESIGNED TO SELL...

ENGINEERED TO STAY SOLD

**W**HEN you put the Seneca on your sales floor, you're featuring one of the most attractive gas fired winter air conditioners on the market. Its colorful jacket catches the eyes of all who enter your store. Then, when you describe its many features, you're on the way to another sale.

Designed for small to medium sized homes, the Seneca has features usually found only in costlier units. Its heating element is constructed of corrosion-resisting copper bearing steel, with seams welded for permanence. Baffles in large radiator conduct gases through multiple passes, heating entire radiator before gases enter flue.

For complete information about the Seneca and other American-Standard Heating Equipment for LP-gas, contact your Wholesale Distributor. **American Radiator & Standard Sanitary Corporation**, P. O. Box 1226, Pittsburgh 30, Pa.

### The BUDGET Automatic Storage Water Heater

Has fuel-saving cast iron blue flame burner and safety controls. Correctly baffled center flue insures quick recovery. Rockwool blanket insulation between heavy galvanized steel tank and trim jacket prevents heat loss, increases efficiency. Comes in 3 sizes—20, 30 and 40 gallon capacities.



Look for this *Mark of Merit*

*Serving home and industry*

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILER • ROSS HEATER • TONAWANDA IRON

2. He knows his equipment thoroughly.

3. He constantly takes safety precautions.

4. He keeps himself in good physical shape.

5. He capitalizes upon past experience and observation.

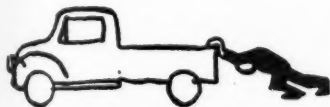
Here are some of the things he does that any truck driver would do well to copy:

## BEFORE STARTING OUT

1. Look under the truck for oil or water leaks or leaks in the fuel or cargo piping.

2. See that no parts of the body, mirror, light, reflectors, chassis springs, steering mechanism, wheels and hub or rim nuts, windows or windshield are bent, broken, misaligned, or missing.

3. See that no parts of the body, brakes, fuel system, lights, chassis



## DAILY WORK PROGRAMS

springs, wires, or other parts are sagging or hanging free below the truck.

4. Check tires. See that they are adequately inflated, without any bulges, blisters, cuts, or other indications of weakness.

5. Test hand and foot brakes. Try the horn, headlights, steering mecha-

## GOOD HIGHWAY HABITS

nism, and windshield wiper, making sure all are in good working order.



## ON-THE-JOB PARKING

6. See that all light filaments burn white when the generator is operating.

(Note: At least every six months, preferably oftener, check all electric wiring and connections to see that they are well secured in place and are free from cuts or other defects which could cause an open or short circuit).

7. Inspect piping and pump packing gland. Check hoses and hose valves for signs of wear and damage.

8. Check rotary gauges and capacity gauges for packing gland leakage. Check tank mounting for indications of movement or strain on piping.

9. Check fire extinguisher and bracket.



## VEHICLE OPERATION

10. Check to see if wheel blocks are on board.

## ON THE ROAD

1. The cardinal rule is: Don't take chances. (You are trying to get a load to a customer, not yourself to a hospital.)

2. Observe all traffic laws.

3. Consider the advice of one driver who was quizzed about his fine safety record: "I've never had an accident because I drive as if all the other drivers on the road were just a little bit crazy." This attitude is called



## DISTANCE FROM VEHICLE AHEAD

"defensive driving," and means that you should:

a. Watch for motorists who may ignore stop signals.

b. Slow down at intersections.

c. Give stoplight warnings to drivers behind you by pumping the brake pedal.

d. Don't take a hand signal as definite proof that the driver is going to do what he signals.

e. Keep plenty of space between your truck and other vehicles on the road.

f. Use your brakes, horn, lights, accelerator, etc., as they should be used. Never try to substitute—horn for brake, for example. And watch out for drivers who do.

## GOOD HIGHWAY HABITS

g. Keep to the right, letting the hot-rods and other speeders go on by.

## AT THE STOP

1. After stopping, set hand brake and chock wheels.

2. Follow good tank filling routine. (See chapter on "Filling at Consumer's Premises.")

3. Make a check for leaks or uncapped openings.

4. Check any gas vapors noted.

Look for leaks. If any are found, repair or call for assistance. Do not move truck before repairing leak.

The LP-Gas truck driver has to be better than a good driver. Besides driving on the main highways, he is obliged to get his vehicle over back roads and in and out of driveways that require more than ordinary over-the-road skill. He also has to know his product and how to handle it safely.

Select your drivers carefully, give them good and well-maintained equipment and a thorough training in the details of the delivery operation. Reward a perfect record.

These things will help to keep your record clean.

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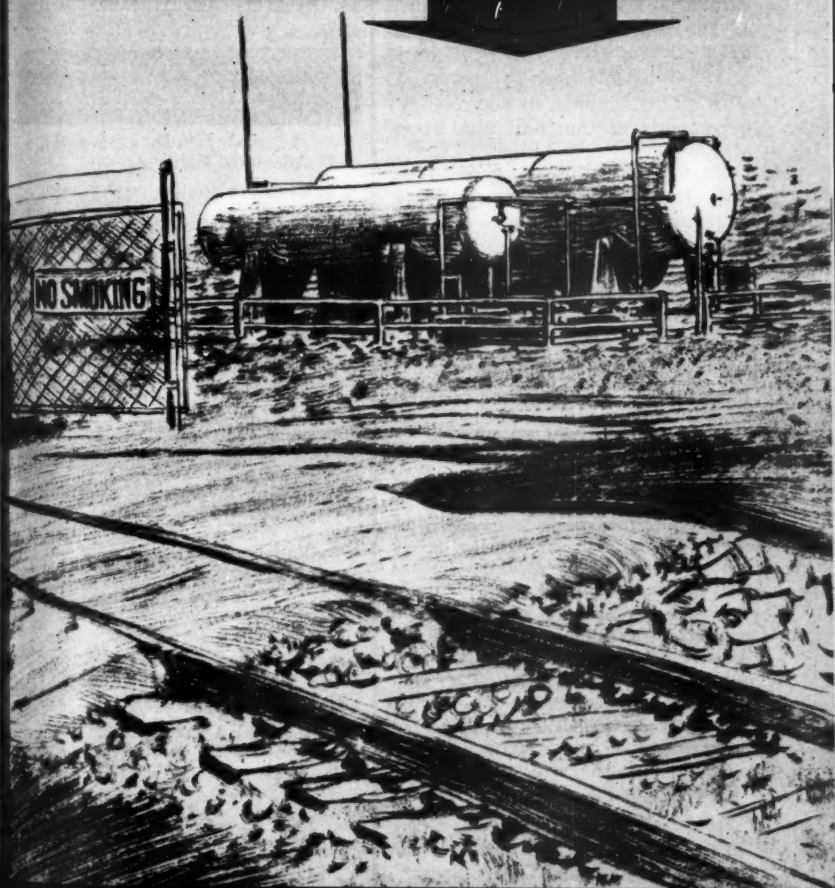
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Newt

# PLANT

GOOD DESIGN, APPROVED EQUIPMENT,  
AND CONTROLLED OPERATING PROCEDURES  
BUILD SAFETY INTO THE PLANT.



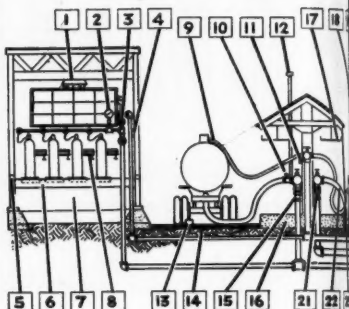
### SAFE PRACTICES FOR BULK STORAGE PLANTS

**T**HE safeguards built into a bulk plant can be divided into two categories: Those required because of the inherent characteristics of the fuel and those involving location, extent and type of operation, with embellishment to suit the requirements of the individual operator.

The first safeguards are fundamental and are practically automatically included in any well engineered or well planned installation, and it is mandatory that they be incorporated in any plant handling LP-Gas to protect its personnel and the public. These needs are met by adherence to the NBFU Pamphlet No. 58 minimum requirements.

They are essentially the following:

1. That storage tanks be pressure vessels designed for a working pressure that is high enough to safely contain the LP-Gas at temperatures well above the normal atmospheric.
2. Storage tanks that are built and inspected according to the accepted API-ASME or ASME Codes, which guarantee the adequacy of design and quality of material and workmanship.
3. Storage tanks that are protected from excessive pressure by adequate relief valves, the size and capacity



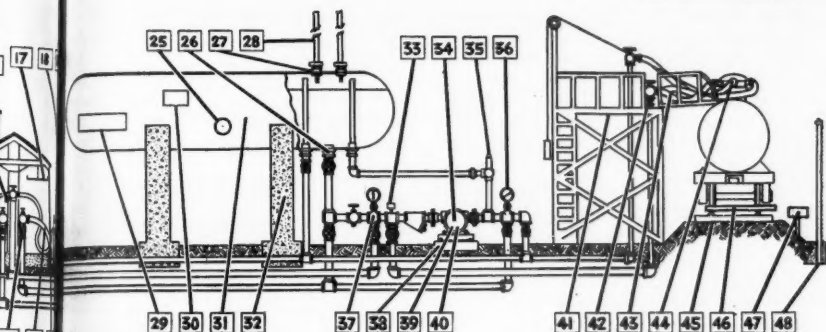
### CYLINDER FILLING

1. Adequate lighting.
2. Pressure gauge on by-pass.
3. By-pass valve.
4. Emergency remote control switch.
5. Ventilation at floor level.
6. Platform at truck height.
7. Solid fill under platform.
8. Scales for accurate weighing.

### TRUCK FILLING

9. Vapor return hose.
10. Relief valve on hose line.
11. Remote control switch.
12. Hose vent line.
13. Wheel blocks to hold truck.
14. Loading area level, paved.
15. Excess flow check valve.
16. Block to protect piping.





## TRUCK UNLOADING

17. Racks to protect hose.
18. Wheel blocks.
19. Fire extinguisher.
20. Flame impingement wall.
21. Check valve.
22. Approved hose and couplings.
23. Shed for operator.
24. Truck internal check valve.

## PUMP INSTALLATION

33. Pressure relief valve.
34. Explosion-proof electric motor.
35. By-pass in discharge line.
36. Pressure gauge — discharge line.
37. Approved valves and fittings.
38. Pump mounted on concrete.
39. Pump designed for LP-Gas.
40. Separate pumps — for butane or propane.

## TANK INSTALLATION

25. Gauging device.
26. Excess flow valve in tank.
27. Safety relief valve.
28. Relief outlet 7 ft. above tank.
29. No smoking, flammable sign
30. Tank name plate.
31. Heat reflecting paint.
32. Concrete foundation.

## TANK CAR UNLOADING

41. Elevated unloading platform.
42. Back flow check valve.
43. High pressure propane hoses.
44. Tank car check valves.
45. Spur track for unloading.
46. Tank car wheel blocks.
47. Men-at-work sign.
48. Fence to prevent trespassing.

## THE BULK PLANT

being determined from conservative formulas to insure the safeness of the tank under unusual outside exposures.

4. Tanks that are securely mounted on substantial fire-resisting foundations to prevent damage due to shifting or falling in case of earthquake or fire.

5. Tanks that are fitted with substantial valves and fittings designed for use with LP-Gas and are satisfactory for the pressures encountered.

6. Piping, fittings and valves of the minimum requirements and that are amply secure for the ordinary operating pressures, as well as being safe during severe outside exposures.

7. Piping, when possible, is located aboveground to facilitate inspection and to eliminate soil corrosion.

8. Hoses and hose fittings that are designed and built to withstand pressures greatly in excess of the normal

operating pressures and are made of materials resistant to the solvent action of LP-Gas.

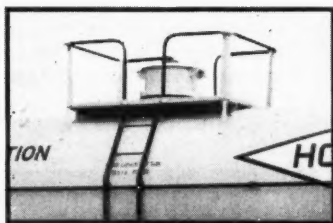
9. Excess flow valves or internal tank valves which reduce the human fallibility factor materially in the event of escape of gas due to failures in hose or pipe.

10. Electrical apparatus and installations that are in accordance with the "National Electrical Code for Class 1, Group D Hazardous Locations" to reduce to a minimum the inherent hazards of ignition from electrical equipment of the ordinary type.

11. The conformance to minimum distances from property lines allowed for the location of tanks to provide safety from outside exposure during the normal operations in the plant.

12. Piping and hoses that are protected from increases in static pressure by the use of relief valves in the lines where needed.

## TANK CARS

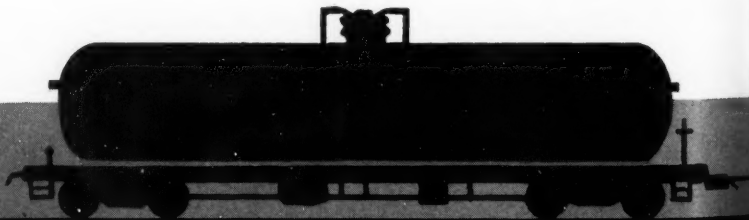


### Tank Car Dome

LP-Gas tank car dome with safety guard rail and ladder.

**M**OST liquefied petroleum gas operators located considerable distances from sources of supply receive their fuel in railroad tank cars built specially for transporting LP-Gases.

These cars are not unloaded like ordinary gasoline tank cars, but require a specific unloading routine.



## THE BULK PLANT

13. The plain markings on gauging device which shows the maximum filling level in tanks or provision for a fixed outage connection from which the maximum filling level can be determined.

Other safeguards which may be incorporated in plants can vary with the size and character of the operation and which are in line with ordinary safety precautions used by handlers of any fuel product and are incorporated into the plant to protect it from accidents due to normal business operations.

Some of these features are:

1. Proper and adequate fencing to keep out undesirables.
2. Crash rails to prevent trucks and cars from injuring piping and equipment.
3. Car unloading rack to reduce

hazard of slipping and falling when connecting and disconnecting hoses.

4. Hose racks to prevent wear and accidental damage to hoses.

5. Tank ladders and platforms with guard rails to reduce chances of falls and injury when opening and closing valves on tops of tanks.

6. Paved yard areas to reduce dirt accumulations and accidents due to ruts and puddles.

7. Adequate yard and plant area lighting to facilitate night operations and to add to protection.

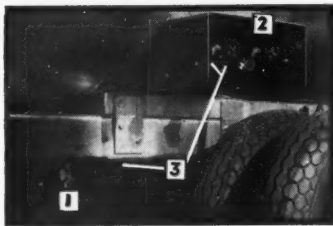
8. Tool racks and work benches to facilitate good maintenance and repair.

9. Shelter house for truck loaders and unloaders so they are able to get out of the weather and still be close at hand during transfer operations.

10. Large yard area and room for orderly parking of equipment.

## TANK TRUCKS

**M**ANY plants receive their supply of LP-Gas by delivery from highway transport trucks. In some areas these trucks are operated by transportation contractors under State or ICC regulations as carriers; in other areas they may be operated by the wholesale distributors of the fuel, and in some instances by the bulk plant operator, himself.

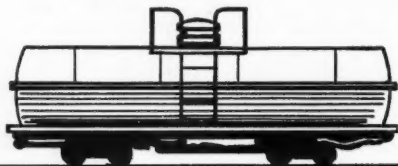


### Filling Connections

(1) Liquid outlet—protected. (2) Vapor return, bypass valves. (3) Outlets protected.



## THE BULK PLANT



## HOW TO UNLOAD

### BEFORE YOU START TO UNLOAD

1. After car is spotted, brakes are set and blocks placed against wheels, both back and front.

2. Car is visually checked for leaks or other signs of bad order. If in serious bad order, shipper is notified at once for instructions as to handling.

3. "Tank car connected" signs are placed in location readily visible to train crews.

4. Ground wire is connected from end of pipeline to steel frame of car.

5. Check is made for open flames, rubbish fires, and any other source of ignition before connections are made.

6. Plant storage is gauged to determine that sufficient space is available to receive the shipment.

7. Plant operating schedule is planned to eliminate lost time and interference with unloading procedure.

8. Plant tank and line valves up to loading spot valves are set for receipt and lines and valves checked for leaks.

9. Seal is broken, dome cover is lifted and all valves are tried to be sure they are closed.

10. The thermometer well cap is removed and an armored thermometer lowered into well so temperature of shipment can be determined for accurate inventory control and later determination if any losses were incurred during unloading.

11. The gauging device protecting

**C**ONNECTING up and unloading tank cars is a routine operation in bulk plants where fuel is received by rail and many years of successful experience in these operations have taught the fact that

cap is unscrewed and placed inside the car dome to prevent loss or dropping on someone below.

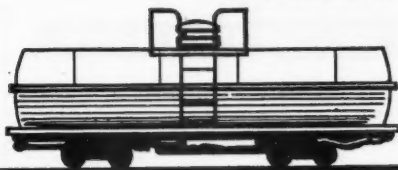
12. The packing gland on the gauging device is checked and, if leaking, lubricant screw is turned down to stop leak; if this is not sufficient, gland nut is taken up slightly to prevent continued leakage of LP-Gas.

13. The tube lock is released, keeping in the clear to prevent being hit in the face in case slip tube comes up rapidly.

14. The slip tube brake is released, the tube pulled up about a foot and the tube valve is opened which will emit a small stream of liquid. Valve outlet should be pointed away from the face to prevent the fluid from impinging on the clothes or skin.

15. Slip tube is raised until liquid ceases to emit and is then lowered slowly until liquid again shows; then tube valve is closed and the marking of the tube at the gauging pointer is recorded. Operation is repeated until operator is sure of correctness of gauging, when the slip tube is pushed back to the bottom and locked in place to prevent damage to the tube due to bumping into it or from wind or other causes.

## OUR TANK CARS



unloading  
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t that

safety and a rational unloading procedure go hand-in-hand.

The procedure breaks into three logical steps—operations preceding unloading, unloading, operations after unloading.

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16. Pipe plugs are removed carefully from vapor valve and liquid education valves, allowing any pressure to dissipate before plug is entirely unsecured, to prevent hand injuries in case of leaking car valve.

17. Vapor return and liquid unloading hoses are connected and tank car valves cracked open slowly to exert car pressure on the hoses. Connections, union connections and hoses are checked for leaks. If connections are not tight, car valves are closed and then connections are tightened or remade and operation is repeated until all connections are tight. Car valves are closed when working on hose or union connections. This is always good practice.

18. The thermometer is removed from the thermometer well, reading recorded, the thermometer well cap replaced, and the net gallons in shipment computed and checked with space in plant storage and bill of lading. Vapor pressure at 100° F on bill of lading is checked to see that product is satisfactory for use in plant tanks to prevent transfer of a high vapor pressure material into tanks designed for a low vapor pressure material.

## PLANT PUMP PROCEDURE

1. The liquid valve at the car unloading spot is cracked open and the line to pump suction is allowed to fill. Valve is only cracked slightly in order to prevent excess flow, causing excess flow valves in tank car to automatically close.

2. The flow of liquid to pump is checked by venting pump and when pump is primed, unloading rack valve is slowly opened to wide-open position.

3. The pump is started and flow controlled by throttling discharge valve to prevent transfer rate faster than excess flow valves on tank car will allow.

4. After pump is running, vapor valve at car unloading rack is cracked open and plant and car pressure allowed to equalize.

5. After the flow of liquid has been established, operator continues to check by eye and ear to see that operation continues satisfactorily and that no leaks or untoward incidents occur, and remains nearby in readiness to shut down operations if and when needed, for any reason.

6. During unloading operations, operator checks receiving tank gauges and pressures and tank car gauge at regular intervals.

7. When the tank car is empty, which is determined by the tank car gauge, the pump is shut off and all plant valves and car valves are closed, receiving tanks are gauged, and losses, if any, determined.

## THE BULK PLANT

### THE COMPRESSOR METHOD

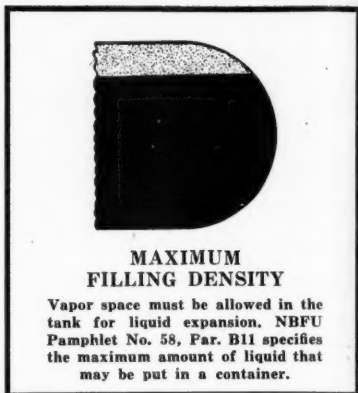
1. Liquid valve at car unloading rack is opened slowly, interconnecting liquid from tank car to receiving tank.

2. Vapor valve at tank car unloading rack is cracked open slowly to allow vapors to compressor discharge.

3. Compressor is started with discharge to tank car and suction from receiving tank to lower necessary tank pressure and increase pressure from car to tank.

4. Do not let tank car pressure get high enough to open relief valve. Check to see that liquid is flowing.

5. When tank car is empty, the liquid line and car valves are closed. The suction from the compressor is connected to the tank car and the discharge to the receiving tank by switching the multiport valve on the compressor piping setup. The compressor is allowed to run until the is



pressure on the tank car is reduced to 15 to 20 psig to remove the remaining vapors from the tank car.

6. When this pressure is reached, the compressor is shut down, all valves are closed and the outlined procedure for disconnecting tank car

### WHEN YOU DISCONNECT... SIX POINTS TO WATCH

1. The bleed valve on the liquid is opened, allowing the remaining liquid in the hose to dissipate to the atmosphere from a point high enough that it will dissipate in the air to prevent the accumulation of concentrations of vapor or liquid near the ground.

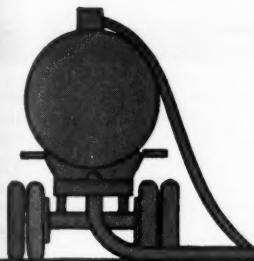
2. The union connection or hose bleed valve in the vapor line at the tank car is cracked, allowing vapors to escape to the air to reduce the pressure on the vapor line.

3. Vapor and liquid hose are disconnected, outlets capped, and the hoses hung on hose racks to preserve the hose and to prevent any LP-Gas from escaping to the atmosphere between unloading periods.

4. The outlet plugs are replaced in the tank car liquid and vapor valves and the gauging devices protecting cap is replaced to put car in order for movement over the railroad.

5. Dome cover is replaced and fastened, access platform is pulled into the clear, wheel blocks and unloading signs are removed and stored away for next time's use, and flammable placards are reversed to indicate an empty car.

6. Operator makes a circuit of car to see that all operations have been completed and car is free for movement. He then notifies railroad that car is empty and supplies return billing instructions to assure quick pick-up and return.



## HOW TO UNLOAD TRANSPORT TRUCKS

**T**HIS type of transportation differs from rail delivery inasmuch as the truck driver is on hand when the load is being transferred, while the railroad crew's responsibility ceases when the car is

spotted on the railroad siding.

In some cases, the responsibility of the complete transfer is upon the truck driver and in other instances the responsibility lies with the plant man.

### WHAT TO CHECK BEFORE UNLOADING

1. The driver spots his truck at the unloading point, sets his brakes and shuts off his engine to eliminate source of ignition.

2. Driver sets chocks front and back of rear wheels to prevent movement of truck.

3. Definite instructions are given as to the relative duties of plant man and driver.

4. Plant gate is closed and locked.

5. Ground wire is connected from the steel frame or tank on both truck and trailer to plant piping.

6. Check is made for open flames, rubbish fires and any other source of ignition before hose connections are made.

7. Plant storage is gauged to determine that sufficient space is available to receive shipment.

8. Plant operating schedule is planned to eliminate lost time and interference with unloading procedure.

9. Plant line and tank valves up to

unloading spot are set for receipt and lines and valves checked for leaks.

10. Individual tanks on truck and trailer are gauged to check amount of load, and gauge devices are closed at once.

11. Bill of lading is checked to see that product has a vapor pressure suitable for storage in the receiving tanks.

12. Liquid and vapor valves on truck tanks are checked to see they are in closed position.

13. Pipe caps are removed carefully from liquid and vapor connections on the vehicle to allow escape of gas that may have leaked past valves.

14. Liquid and vapor hoses are connected to the truck and the plant intake valves.

15. After hoses are connected, the valves on the vehicle tanks are opened slowly to allow pressure on the hoses. If any leaks show, the valves are closed and the connections tightened up or remade.

## THE BULK PLANT

### PLANT PUMP PROCEDURE

1. If plant pump or compressor is available, truck pump is bypassed and plant facilities are used.

2. Liquid intake valve to plant is cracked slowly to prevent excess flow valves on transport from closing.

3. Flow of liquid to the pump is checked by venting pump and when pump is primed, plant intake valve is slowly opened to allow unrestricted flow of liquid to the pump.

4. The pump is started and flow controlled by throttling of discharge valve to prevent transfer rate faster than excess flow valves on transport tank will allow.

5. After pump is running, vapor valve at plant intake is cracked open slowly and transport pressure allowed to equalize with receiving tank.

6. After flow of liquid has been established, operator continues to check

by ear and eye to see that operation continues satisfactorily. When there are both truck driver and plant operator present, one should have complete control over all operations.

7. During unloading operations, operator checks receiving tank gauges and pressure and truck gauges at regular intervals to determine progress of unloading to prevent mechanical injury to pump in case of loss of suction and to prevent overfilling or over-pressuring of receiving tanks.

8. When transport tanks are empty, the pump is shut off and all plant valves and truck valves are closed; receiving tanks are gauged and losses, if any, determined. If losses are unusual, underground lines and other points where leaks could occur without being easily noticeable should be checked.

### TRUCK PUMP OPERATION

The same procedure is used to unload when using the pump on the truck with the following exceptions:

1. When the liquid hose has been connected and tested, the plant intake valve is opened slowly, allowing free passage from the truck to the tank. This is done to prevent excess pressure on the discharge hose when pump is started.

2. After all connections are made and found tight and plant valve is opened, truck motor is started and power take-off engaged to allow pump to rotate. Engine speed is set to allow for proper pumping speed and truck driver stands by his unit until unloading is completed, to be available in case someone in plant might close

a valve against the truck pump, at which time he stops pumping to prevent excess pressure on the discharge hose.

3. After discharge has been completed, driver disengages power take-off and then shuts down truck engine before any hoses are disconnected to eliminate source of ignition when hoses are vented.

4. Usually when there are multiple tanks on a transport, one will empty first. At this time, the liquid and vapor valves are closed on this tank. As the next tank becomes empty, its valves are shut off, and so on until all tanks are emptied. This is done to prevent vapor locking the pump which may happen from drawing on an empty tank.



## THE COMPRESSOR METHOD

1. Liquid line at plant intake is opened slowly, interconnecting liquid from transport to receiving tanks.

2. Vapor valve at plant intake is opened to allow vapors to compressor suction.

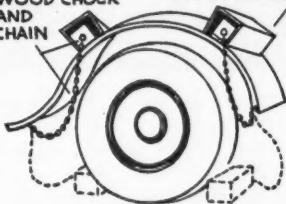
3. Compressor is started with discharge to transport tanks and suction from receiving tanks to lower receiving tank pressure and increase pressure on transport tanks. This causes flow of liquid from truck to plant tanks.

4. The same vigilance in observation is performed as when a pump is used for the transfer.

5. When the transport tanks are empty the liquid line and liquid valves on the transport are closed. The suction from the compressor is connected to the tank truck and the discharge to the receiving tank by switching the

WOOD CHOCK  
AND CHAIN

CHOCK CARRIER



## WHEEL BLOCKS

Chock blocks should be carried and used. Par. 3.16 of NBFU Pamphlet No. 58 requires that vehicles be equipped with blocks and that they be used whenever the vehicle is parked.

multiport valve on the compressor piping setup. The compressor is allowed to run until the pressure on the transport is reduced to 15 to 20 psig to remove the residual vapors from the transport tanks.

## WHEN YOU DISCONNECT... NINE POINTS TO WATCH

1. Before disconnecting hoses, a quick check is made to see that the truck loading and tank valves are closed.

2. Vapor hose is disconnected slowly, allowing pressure to dissipate before connections are broken completely to reduce hazard in handling the hose.

3. The liquid hose is vented through either the plant or truck bleed line to reduce the pressure on the hose and dissipate as much as possible of the liquid to the air.

4. After the pressure is off the hose, it is disconnected from the truck and the remaining liquid, if any, is carefully spread on the ground so it will evaporate.

5. All truck tank outlet connections are capped to put vehicle into proper shape to travel the highway.

6. Hoses are capped and placed in hose racks to prevent wear and damage.

7. Plant operator and truck driver make a tour completely around the vehicle, check openings, remove wheel blocks and driver makes check of tires and running gear to make sure outfit is OK for return trip.

8. Plant man, after checking atmosphere, gives truck driver OK to start engine and proceed on return trip.

9. Plant is secured, gates locked and gauges and reports turned in to office to advise management of status of plant and inventory.

## HOW TO FILL TANK TRUCKS

1. Truck is spotted at the same place at the loading dock each time.

2. Truck engine is shut off before driver leaves the cab.

3. Brakes are set and wheels are chocked to prevent truck rolling.

4. Before connecting hoses, driver makes a quick check of truck and plant for any unusual conditions so as to prevent the loading of truck interfering with previous set operations.

5. After liquid and vapor hoses are connected, valves on truck are opened slowly to allow pressure on hoses and connections, which are checked for leaks before opening plant valves.

6. Plant valves are opened and liquid transfer started. The driver or plant man stands by during transfer.

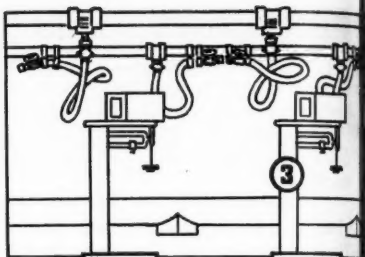
7. During loading operation, driver checks tank level at regular intervals.

8. When tank nears capacity point, driver checks for level and fixed capacity outage valve, standing by until liquid shows to prevent overfilling.

9. After pump is shut down and valves closed, tank truck is given final gauge and, if overloaded, excess is returned to plant to allow proper vapor space above the load for expansion of the liquid.

10. After filling, hoses are disconnected at once and stowed on racks to prevent damage.

11. Before getting into truck, driver walks completely around truck, making quick check of condition of running gear, hose storage, truck piping, valves and conditions at loading rack to insure that truck is safe for the road and plant is secure.



## HOW TO FILL CYLINDERS

1. Cylinder filling can be done in the open but in climates where it is necessary to use a building, good ventilation is provided particularly at the floor level, as the operation of making and breaking the hose connections releases a small amount of gas each time and provision must be made to prevent its accumulation.

2. Filling floors are tight and preferably on a solid fill to prevent gas accumulation under the platform or building.

3. Only approved cylinders with approved and proper fittings are filled to prevent accidents in handling and use.

4. Before filling, cylinders are checked for damage in transit and any cylinder visibly in bad order is withdrawn from service. Such cylinders may be reconditioned and returned to service under conditions set out by the regulatory authority that has jurisdiction.

5. Before any cylinder is filled, it is checked to see that it is fitted with relief valve or fuse plugs to prevent bursting, should it be in a fire later.

6. Before filling, weighing scale is set to adjust for tare weight of the

# FILL CYLINDERS

cylinder, because weights of individual cylinders vary.

7. Scales are checked regularly for accuracy to insure correct measurement.

8. To prevent overfilling, the filling operation is stopped manually or automatically when the predetermined amount of fuel is in the cylinder.

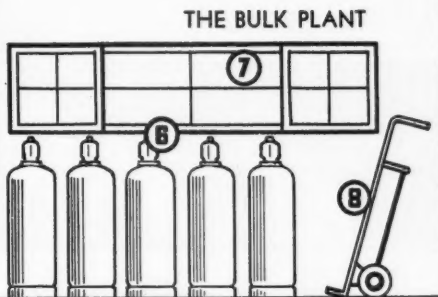
9. Cylinders are not filled full but only to the allowed limit as prescribed in Par. B11—NBFU Pamphlet No. 58, to allow room for expansion of the liquid with change in temperature.

10. After filling hose has been disconnected, charged cylinder weight is checked to prevent false weights due to weight of hose and hose valve, causing error.

11. Overfilled cylinders are vented down to correct weight through a vent line discharging in a safe place to prevent undue accumulation of gas in filling room.

12. After filling, cylinders are checked for valve and thread leaks to prevent loss and hazards in shipment.

13. After cylinders have been checked, valve protection cap is

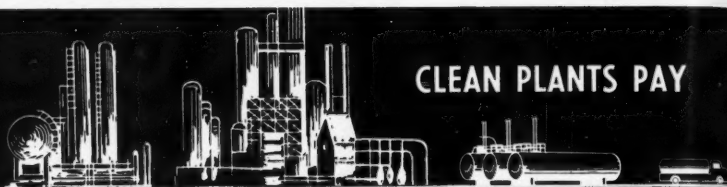


## FILLING PLANT

- 1** Approved piping, fittings and hoses to eliminate leaks.
- 2** Floor level ventilation to prevent accumulation of discharged vapor.
- 3** Accurate scales with close precision scale to assure correct filling of cylinders.
- 4** Return line to top of overfilled cylinders to prevent escape of vapors.
- 5** Vapor proof electric switches and fixtures to prevent ignition from electrical sparks.
- 6** Cylinder valves protected by caps to prevent damage in handling.
- 7** Large window for good lighting to help easy reading of scale and stampings on cylinders.
- 8** Hand truck to handle cylinders to increase safety in operation.

screwed on hand-tight to prevent damage to valve when cylinders are in transit.

14. Contents of leaky or damaged cylinders are removed by venting into a vacuum return line or to atmosphere in a safe place.



### CLEAN PLANTS PAY

1. The plant is kept clean at all times by removing weeds, rags, tools, and scattered materials because a policy of cleanliness and orderliness in the plant instills confidence in both employees and the public.

2. A good tool kit is kept on hand, including the necessary hand tools and work-aiding devices, as good tools help to make good workmen.

3. Damaged tools are repaired or destroyed as the use of damaged or worn-out tools causes accidents.

4. Fences are kept in good repair and gates kept locked to prevent entrance by unauthorized persons and children.

5. Owners and employees make a visual check of plant and equipment on every occasion they have to be at the plant.

6. A systematic check is made daily of condition of valves, piping, pumps and other equipment, looking for evident leaks or potential trouble, and anything out of order is taken care of at once to prevent need of emergency repairs.

7. Rubbish, old crates, and other flammable materials, are stacked in one place in the clear and are removed from the premises at regular intervals, to prevent rubbish fires and accidents due to nails in boards.

8. Idle trucks and equipment are parked in the clear to prevent collisions and accidents when backing and turning trucks.

9. Daily inventories of LP-Gas product is taken and recorded to check against leaks.

10. Pumps, motors, and compressors are kept lubricated and packing glands are maintained in good order to prevent freeze-ups and burnt-out motors, with consequent electrical hazards.

11. Routine check is made of electrical fixtures, fittings and fuse boxes to prevent possibility of source of ignition due to faulty or improper electrical equipment.

12. Hoses, hose couplings and hose connectors are checked regularly for signs of damage or weakness and replaced or repaired before they may become a cause of release of LP-Gas.

13. When repairs or changes are made in piping involving cutting into lines, piping is disconnected and purged and removed to an open area to prevent flash fires.

14. When making major repairs to plant or piping, all live connections are plugged or blinded to prevent escape of fuel due to opening of valves.

15. Fire extinguishers are checked either by plant personnel or a testing firm at regular intervals to make sure they are in proper working order in case they are needed.

16. Yard area and driveways are kept free of ruts and holes to prevent accidents.

17. Customer tanks not in use are stored in clear area with valves kept closed to prevent damage to tanks.

18. Hand trucks and tank handling equipment are provided and kept in good repair to reduce accidents due to handling appliances and tanks.



## TOWN PLANTS

**A** SECTION of the industry that is important but which operates quite differently from the average LP-Gas dealer or distributor is the piped town plant.

Many of them operate under the control of utility commissioners whose rules and regulations take precedence over those under which most dealers work.

1. Competent engineering advice is obtained for plant design and distribution system layout to insure the safety and dependability of the operations.

2. Provision is made in plant design to eliminate the possibility of failure to provide gas to the distribution system to prevent a service shut-down and the expense and hazard of a complete individual turn-off and later turn-on for each meter.

3. A complete and accurate record of unaccounted-for gas is kept to hold down losses and prevent the possibility of a major leak causing a hazardous condition.

4. Distribution system leakage is held to an economic minimum to reduce the hazards of line leaks.

5. When a distribution system is changed over from manufactured to LP-Gas, appliance locations are checked and proper means of ventilation are recommended to the user to provide for the difference in weight of LP-Gas and manufactured gas.

6. Automatic controls are provided

at the plant to prevent entrance of liquid into the distribution system to avoid excess pressures developing.

7. Meters designed or rebuilt for LP-Gas are used to prevent leakage around packing glands and through body gaskets.

8. Distribution systems are preferably welded, or of cast iron with mechanical joints, to prevent drying out of packed joints and possible leakage.

9. The use of full automatic safety pilot and burner shutoff controls is recommended to utility customers to reduce hazards of flash-backs or accumulated gas due to pilot failure.

10. Tools and personnel are maintained available for emergency work on distribution system or plant to prevent gas outages due to accidental damage to mains.

11. When meters are disconnected, service lines are plugged and capped to prevent misuse or escape of gas.

12. House piping is checked for leakage when meters are turned on and if any existing leaks cannot be located, service is turned off until repairs are made to prevent accidents.

13. After turn-on, servicemen check and light all pilots on appliances to reduce possibility of customer accidents due to lack of knowledge of appliance operations.

14. All meters are provided with shutoff cocks located in a convenient and accessible spot so house gas can be shut off in an emergency.

15. Distribution system pressures are maintained within allowable limits to prevent pilot outages.



## INTERNAL COMBUSTION ENGINES

**B**UTANE and propane are extensively used as fuels on trucks, tractors, buses, farm equipment and stationary engines.

Operating data have proved the safety of these gases as fuels and in most cases they are less hazardous to use than gasoline.

1. Fuel containers are made in accordance with the ASME or API-ASME codes with a working pressure high enough to safely handle the fuel to be used to assure safe carrying.

2. Fuel containers are mounted on vehicles with ample road clearance.

3. Valves and fittings on fuel tanks are located or guarded to prevent damage in case of collision.

4. Fuel tanks are firmly supported from the bottom by brackets or platform to prevent undue concentrated load on parts of the tank shell.

5. Fuel tanks are tied to brackets to prevent rotation or lateral motion.

6. Fuel tanks are equipped with excess flow valves to stop outflow of liquid in case of break in fuel line.

7. Outlet of fuel tank safety valve is located so escaping gas will not enter cab or engine compartment. This is to prevent fires.

8. Fuel lines from tank to high pressure regulator are seamless copper tubing with flare type fittings encased in loom and firmly supported to prevent breakage due to vibration.

9. When possible, high pressure regulators are located on brackets

attached to the chassis rather than on the engine to reduce the vibration in the liquid fuel line to a minimum.

10. When high pressure regulator is located on engine mounting, a high pressure flexible fuel line is used between the chassis and the regulator to prevent breakage of the fuel line.

11. When working on regulators or filters, fuel is removed from the fuel line and vaporizer by shutting off tank valve and allowing engine to run until fuel in the system is used up to prevent escape of fuel into engine compartment.

12. Before draining regulators, engine is stopped to prevent flash ignition from spark plugs or generator.

13. When general repairs are to be made on truck, fuel valve is shut off at tank and engine run until fuel in system has been used up to prevent accidental release of fuel to the atmosphere while working on truck.

14. Fuel lines and connections are tested at regular intervals with soap suds to detect minor leaks that might develop into line breaks to insure full safety of operation.

15. When equipment is parked in closed garages, fuel valves are shut off at tanks after parking.

16. On bus installations, engine compartment is separated from passenger compartment and intake air to the manifold is not taken from the bus interior to prevent fire or damage to passenger compartment from back-firing of the engine.

17. Fuel tanks are filled cut-off doors to prevent gas accumulation in buildings in case of broken hose or leaking fill valve.

# FIRE PROTECTION

**F**IRE protection comprises three aspects of fire: prevention, control, and extinguishment. These are independent phases of the fire fighting problem and involve both scientific engineering and safety training.

Control of LP-Gas fires may be a new idea to employes as well as to some professional firemen. In some cases, it may be undesirable or hazardous to extinguish a fire. It may be better to permit the fire to burn itself out, meanwhile protecting the areas and equipment exposed to fire, and holding the main fire in check to prevent its spread unless a means of stopping the flow of gas or liquid can be made possible by extinguishing the flames, or possibilities of reignition can be completely eliminated, or the pressure has dropped to a point where a closure can be made.

# LP-GAS

• WHEN IT IS SAFE • WHEN IT'S A HAZARD

■ LP-Gases are heavier than air and tend to settle downward, while natural and manufactured gases are lighter than air and travel upward.

The practical result of this is that if a gas leak occurs, natural and manufactured gases will accumulate near the ceiling or escape through the vent or other openings, while LP-Gas vapors tend to accumulate close to the floor or flow out through bottom openings.

■ Good ventilation will disperse vapors of any kind, whether they are lighter or heavier than air, and good ventilation is essential for safety where combustible vapors exist.

■ Butane and propane, like air, are gases and tend to mix rapidly as is the nature of all gases. This is known as dispersion and it is greatly accelerated if there is a movement of the gases due to agitation or air currents.

■ Flame cannot get into or exist inside an LP-Gas tank when it contains fuel because vapors are not combustible without proper amount of air being present. Leaking gas will burn from tank outlets but flame will not travel back into the tank. When pressure on the tank decreases, the burning outlet can be safely snuffed out and capped off.

■ It is practically impossible to ignite LP-Gas vapors from the ordinary friction sparks, such as striking two

pieces of metal together, striking a nail in the shoe on a concrete pavement, or the sparks from an emery wheel. Many experiments have been made that prove that, except under special conditions, ordinary friction sparks will not ignite vapor-air mixtures. Sparks from cigar lighters and gas lighters (which will ignite gas-air mixtures), are produced from special alloys and are not comparable to ordinary sparks.

■ There need be no mystery about LP-Gas. Its chemical and physical properties lie in between natural gas and gasoline and has some of the properties of each. Treat it as you would these two products, using equal precautions, and you will be safe.

MANUFACTURED  
GAS

NATURAL  
GAS

LP-GAS





FIG. 3

■ It takes a higher temperature to ignite LP-Gases than to ignite paper but the flame from burning paper will ignite LP-Gases. This can be demonstrated by heating a soldering iron to just below red hot. If clean, it will not ignite gasoline or LP-Gas, but it will start a piece of paper to burn. The tops on full gasoline cans are safely soldered but care is always used so no flaming dirt, soot, or other material is on the iron.

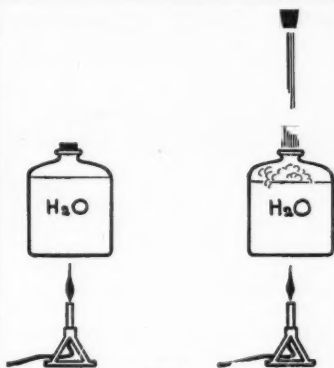


FIG. 4

■ Any liquid can cause an explosion, even water. If water is placed in a closed container and heated to a little over 212° F, its vapor pressure will be increased to a point where it can be read on a pressure gauge. If additional heat is applied, the pressure will continue to rise and if the container is not equipped with a safety valve of adequate size, the container will burst. This is a boiler explosion.

■ Liquid butane or propane can cause an explosion similar to water. The difference is the temperature required to cause the increase in pressure. Instead of requiring a temperature of 212° F, atmospheric temperatures will increase the vapor pressure of these prod-

ucts so they cannot be handled in ordinary drums or cans. They must be stored and handled in special containers. All containers for LP-Gas must be of proper design and construction must be safeguarded against excessive pressures by adequate relief valves.

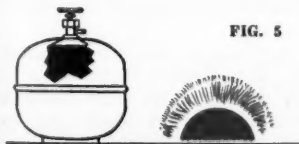
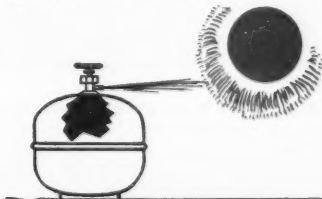


FIG. 5



## FIRE PROTECTION

■ Any fuel can cause an explosion. Wood, coal, kerosene, stove oil, gasoline and LP-Gas can be made to cause an explosion. If flame is applied momentarily to several fuels, natural gas, wood, coal, kerosene, gasoline, stove oil, and butane gas, it will be observed that the gases ignite very quickly and easily and the only liquid that will catch fire easily is the gasoline. The solids are not affected.

Actually, the liquid gasoline does not burn. It is the vapor given off from the gasoline that burns.

The kerosene and stove oil do not ignite because the vapor pressure of these materials is so low at atmospheric temperature that they are giving off no gas.

A little kerosene on a wick ig-

nites readily because the heat of the flame immediately increases the temperature of the kerosene and raises its vapor pressure so it gives off enough vapor to burn.

Solid fuels also usually must first be converted to vapor before they will burn.

Finely divided solid fuel burns readily when exposed to flame just the same as kerosene. Flour, coal dust, and similar materials, suspended in air are easily ignited.

When ignited in the open, none of these fuels burn rapidly enough to cause an explosion.

To cause an explosion the fuel and air must be confined in a closed space, must be mixed in proper proportions, and have a source of ignition.

■ The proper proportions of air and gas to cause an explosive mixture are known. This is designated as the explosive range. The explosive range for gasoline is between 1.3 and 6.0% of gasoline vapor in air.

A breaker is partly filled with gasoline and a spark is made at the points marked 1, 2, 3, etc.

No ignition will occur in position 1 because the gasoline vapors have been dispersed before reaching this spot.

In position 2, although there is  $\frac{1}{2}$  of 1% gasoline vapor present, it is too lean a mixture to ignite.

Positions 3 and 4 are on the borderline of the explosive range, and the mixture of air and gasoline vapors will ignite.

In position 5, although there is 75% air present, the mixture is too rich to ignite.

In position 6 there is no air pressure so no ignition is possible.

IGNITION POSSIBLE		PERCENT	
		AIR	GASOLINE VAPOR
NO	X-1	100	0
NO	X-2	99½	½
YES	X-3	98.7	1.3
YES	X-4	94	6.0
NO	X-5	75	25
NO	X-6	0	



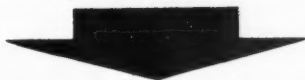
FIG. 6

■ L-P Gas is similar to gasoline but has a slightly narrower explosive range. Boiler type explosions are prevented by using approved code built containers.

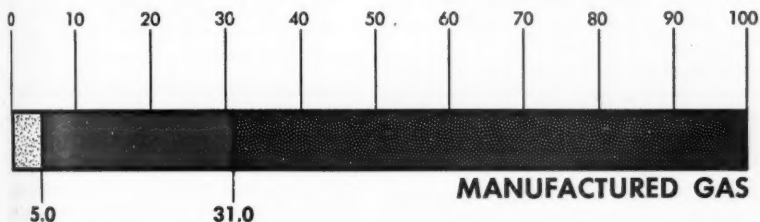
# BUTANE AND PROPANE

COMPARE FAVORABLY WITH OTHER GASES COMMONLY USED

IT IS ESSENTIAL TO KNOW ITS CHARACTERISTICS



## PERCENTAGE OF GAS IN AIR



MANUFACTURED GAS



NATURAL GAS



PROPANE



BUTANE



TOO LEAN



EXPLOSIVE  
RANGE



TOO RICH

# LP-GAS FIRES

ARE EASIEST TO CONTROL

**I**N training to fight fire, the men should be taught to move in close to the blaze. Thus, they learn the effectiveness against fire of water spray (commonly called "fog") and chemical equipment. Hysterical fear of fire, one of the greatest obstacles to adequate control, is thereby dissipated.

Employee reaction to the fire situation ought to be virtually automatic. Frequent and rigidly disciplined drills are the answer to meeting coolly any crisis.

There is seldom time for preparation when a fire is in process. The first five minutes of any fire are the most important. Records show that fires discovered and properly attacked in the first five minutes frequently can be handled by first aid fire equipment. Fires which are not caught in the first five minutes frequently result in huge losses. An exacting training program is the most substantial answer to undelayed, efficient fire control and extinguishment.

In a properly designed and maintained bulk plant where good housekeeping is the rule, there never should be a Class A fire larger than can be handled with portable equipment. Office and warehouse buildings, however, are subject to fires, so soda-acid and water extinguishers, pump tanks and permanently installed garden hoses should be included in equipment.



## CLASS 'A' FIRES

Class A fires: Miscellaneous combustibles such as wood, paper, textiles, rubber, and trash. They are best fought by removing heat. Water is the best medium.

In the case of Class A fires, dry chemical powder or carbon dioxide extinguishers are effective in controlling, but final extinguishment must be accomplished by cooling, generally requiring the application of water.

In fighting a Class A fire, the stream is directed from the extinguisher to the base of the flames. The fuel must be "overhauled" after the fire to insure that no glowing embers remain which might cause re-ignition.

## SUGGESTED L

Suitable fire equipment depends on two factors: Size of risk and whether the fire anticipated is to be from burning liquid or burning vapor. It is economically impractical to provide for protection against every contingency at every installation. A suggested list is as follows:

**Small Consumer Installations:** At most, a small CO<sub>2</sub> or dry chemical extinguisher or garden size hose.

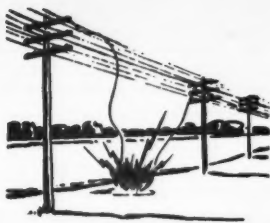


## CLASS 'B' FIRES

**Class B fires:** Flammable liquids and vapors. Best fought by smothering, although cooling is sometimes effective. These are subdivided into:

a. Contained fires, in tanks, vats, and sumps. b. Running fires, involving a flaming stream substantially in one plane. c. Three dimensional fires, in which fuel is burning in more than one plane.

Class B fires comprise a special problem. Dry chemical powder extinguishers are particularly effective on them, but foam, carbon dioxide and carbon tetrachloride units are helpful on small fires. Three-dimensional Class "B" fires, however, require water fog, carbon dioxide or dry powder units. LP-Gas fires which can be killed with dry powder extinguishers, must not be extinguished unless by so doing access to a shutoff valve is permitted.



## CLASS 'C' FIRES

**Class C fires:** Fire in or involving electrical equipment. Best fought by killing circuit and by smothering.

Fires in or involving electrical equipment, Class C fires, may be dangerous to the operator if improperly fought. Soda-acid or foam are never used because of the current-carrying capacity of the streams. Water may be safely applied with a fog nozzle at close range.

In any case, it is desirable to kill the circuit if possible before attacking the fire. Electrical fires may then be extinguished with carbon dioxide or dry chemical. Carbon tetrachloride may be used if neither is available.

## OF SUITABLE FIRE FIGHTING EQUIPMENT

**Large Industrial Installations:** At least one large type CO<sub>2</sub> or dry chemical extinguisher and one combination water spray and stream nozzle on a 1-in. hose. Very large installations may require 1½-in. hose.

**Bulk Delivery Tank Trucks or Trailers.** One large CO<sub>2</sub> or dry chemical hand extinguisher per truck.

**LP-Gas Bulk Plants:** At least one hand extinguisher per transfer unit. Wherever water pressures are suit-

able, a combination water fog and straight stream nozzle on 1-in. hose. Major water protection is considered available from municipal fire departments in this case.

**Standby Storage:** A properly designed automatic permanent water spray installation may be helpful if personnel is not always available and should be supplemented by fog nozzle protection. This is a specialist's problem.

# TYPES AND USES

## TYPE

### Soda-Acid

- A—Sulfuric acid.  
B—Sodium bicarbonate in water.



The soda-acid extinguisher has little or no place on oil properties. It is dangerous to use on elec-

trical fires because of the conductivity of the water stream resulting from its high salt content. Likewise, while the skilled fireman can use it effectively on a limited number of types of oil fires, it may cause a spread of the fire in the hands of the unskilled person. Generally, it may be considered that the soda-acid extinguisher is usable only on small Class "A" fires and only to the extent that 2½ gals. of water from any other source can be effective, if properly applied.

### Carbon Tetrachloride



The carbon tetrachloride (vaporizing liquid) extinguisher has been a useful piece of equipment during the years it has been available. It still is useful in some locations. It has several faults, however, that justify its replacement by more generally useful extinguishers for most services.

### Foam

- A—Aluminum sulfate.  
B—Bicarbonate, with foam stabilizer.



For many years the foam extinguisher has been the standby of the petroleum industry. It is useful

on many fires, particularly those in pans, tubs, or other containers, where there is sufficient outage to permit discharging the foam against the inside wall of the container. However, foam, especially relatively small quantities, is adversely affected by water or soda-acid discharge. Alcohol or acetone rapidly dissolves foam. Unusually high application rates and large quantities are needed.

Foam extinguisher is practically useless on three-dimensional fire.

# S CORE EXTINGUISHERS

## OPERATION & ACTION

**OPERATION:** Carry extinguisher to fire and invert, directing stream from hose at base of fire.

**ACTION:** When the extinguisher is inverted, a lead stopple drops from the acid bottle, permitting the acid and the sodium bicarbonate solution to mix. The resulting chemical reaction results in the formation of carbon dioxide gas which exerts pressure inside the extinguisher forcing the stream of water through the hose.

## USE

**USE ON FIRES:** The discharge from a soda-acid extinguisher is rated at 30 to 40 ft. but seldom will be effective at such ranges. It is better to approach as near as possible to the fire before inverting the extinguisher. For the various classes of fire, the soda-acid extinguisher may be rated as follows:

Class "A"—Useful.

Class "B"—Do not use.

Class "C"—Do not use.

**OPERATION:** Carry to fire, turn handle to release catch and pump, directing stream at base of fire or on side-wall of container.

**ACTION:** A double action pump takes suction regardless of the position of the extinguisher and discharges a practically continuous stream of liquid. The heat causes the fluid to evaporate instantly, forming a heavy gas which will not burn nor support combustion.

**USE ON FIRES:** The discharge is rated at 20 to 30 ft. but will not be effective at such ranges except in the hands of an expert. As with other extinguishers, it is better to approach as near as possible to the fire before starting to pump. For various classes of fires, the carbon tetrachloride extinguisher may be rated as follows:

Class "A"—Useful on small fires.

Class "B"—Useful on small fires.

Class "C"—Useful.

**OPERATION:** Carry extinguisher to fire and invert, directing stream from hose at base of fire, against inside wall of container or form a spray by holding a finger loosely against the nozzle.

**ACTION:** The solutions mix, and, by a chemical reaction, form carbon dioxide gas. The stabilizer in the bicarbonate ("B" solution) holds the gas in the form of bubbles. The gas has no effect other than to cause the foam to float.

**USE ON FIRES:** The stream is rated at 30 to 40 ft. but seldom can be directed effectively at such range. For the various classes of fires, the foam extinguisher is rated as follows:

Class "A"—Useful.

Class "B"—Useful.

Class "C"—Do not use.

# TYPES AND USES (IR

## TYPE

### Carbon Dioxide

A—Carbon dioxide gas.  
B—Liquid carbon dioxide.



The carbon dioxide extinguisher, which is newer than the soda-acid, carbon tetrachloride, or foam extinguisher, combines the best features of each for petroleum prop-

erty service. It is not suitable for Class "A" fires because it has little or no cooling effect but will control small ones. It will extinguish all Class "B" fires that can be handled by foam or carbon tetrachloride, as well as being suitable for vapor and three dimensional fires that cannot be handled by the others. It possesses the disadvantage that the gas stream is readily deflected in strong winds. However, because it leaves no residue it is especially suitable for use in indoor locations where wind is not a factor.

### Dry Chemical

A—Liquid carbon dioxide.  
B—Dry compound.



The modern dry compound extinguisher is highly efficient on oil or vapor fires. It is as good

as either foam or carbon dioxide on Class "A" fires and can be used with perfect safety on Class "C" fires. It is particularly useful in conjunction with fog on large fires, having better spread and carrying power than carbon dioxide. The sodium bicarbonate powder is specially treated to render it water-resistant. Because of the directional drive of the powder, the extinguisher can be used in a high wind. Since the powder is visible, its path can be observed and can be directed to the best advantage. If not all of the charge is used, the remainder is available for as much as an hour, before the pressure leaks out.

### Water Spray (Fog Nozzle)



The primary essential to be kept in mind when selecting fire control equipment is its field of usefulness and its capacity. Water fog has been found very satisfactory for the purpose of protecting surroundings and to control the intensity of the fire.



# FIRE EXTINGUISHERS

## OPERATION & ACTION

**OPERATION:** Carry extinguisher to fire and aim horn at fire. Pull locking pins if present and open valve or squeeze trigger or grip. Always aim at base of the fire and follow upward if three dimensional.

**ACTION:** The pressure of 850 psi (at ordinary temperature) forces the liquid carbon dioxide from the bottom of the extinguisher through the internal riser pipe and out of the hose and nozzle.

**OPERATION:** Carry extinguisher to fire and set down. Pull locking pin, and turn valve wheel to left. Aim nozzle at base of fire, and squeeze the grip. Follow fire upward in the case of three dimensional fires.

**ACTION:** Turning the valve wheel to left punctures the pressure disc in the carbon dioxide cartridge, pressuring the outer chamber. Squeezing the grip-valve permits the powder to be blown out of the outer chamber. The powder has some cooling effect in itself, and absorbs additional heat in decomposing to give off carbon dioxide which smothers the fire.

Combination type spray nozzles that also provide a straight stream, for reach and hitting power, are most useful because they can be used not only to knock down fires under pressure but also to provide water screen protection necessary to make shutoff valves accessible.

## USE

**USE ON FIRES:** The effective range of the gas is from 3 to 5 ft., preventing the use of the extinguisher on widespread fires. In conjunction with fog, the extinguisher is usable on much larger fires than when used alone. For the various classes of fires, the carbon dioxide extinguisher is rated as follows:

Class "A"—Controls small fires.

Class "B"—Useful on all fires.

Class "C"—Excellent.

**USE ON FIRES:** The full size (20 lb. to 30 lb.) dry compound extinguisher is rated at 8 to 10 ft. discharge but, under average conditions, will do better. It is not necessary, and sometimes less effective, to approach the fire too closely. For use on the various classes of fires, it may be rated as follows:

Class "A"—Useful for control.

Class "B"—Excellent on all.

Class "C"—Excellent on all.

Spray nozzles to protect plant storage tanks may be selected on the basis of the coverage obtained at the actual nozzle pressure available with the understanding that fire department boosters may be able to increase their output and coverage.

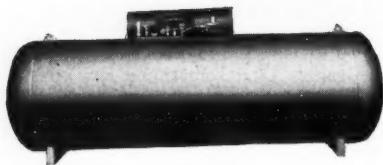
# COLUMBIAN



## BUTANE-PROPANE

**Transport Trucks • Semi-Trailers • Storage Tanks**

COLUMBIAN Semi-Trailer Units like the 4,000-gal., double-barreled LPG Transport pictured below, are masterpieces of engineering that give you trouble-free, low-cost operation. Manufactured in any capacity within limitation of your state highway regulations.



## COLUMBIAN STORAGE TANKS

(Left) Above-ground and Under-ground storage tanks that are quality built for long years of efficient operation—available in all sizes—all A.S.M.E. tanks.

## COLUMBIAN LP-GAS Delivery Tanks

(Right) Full-Skirted Standard Tanks with special cylinder brackets for bottled gas. Pump mounted with direct driven power take-off. All control valves and print-o-meter in rear can box.



Take advantage of Columbian's 55 years of tank building experience—plus a reputation for advanced design and engineering excellence that has won recognized leadership throughout the industry. WRITE NOW FOR COMPLETE FACTS and NEW LOW PRICES.

**COLUMBIAN STEEL TANK CO., P.O. Box 4226-0, Kansas City, Mo.**

# CONSUMER EDUCATION

**C**USTOMER satisfaction with LP-Gas is increased if supported by a thorough understanding of how appliances function and basic facts about the fuel.

It becomes the obligation of a dealer making an installation to explicitly instruct the users in every operation that they will be called upon to perform.

Many dealers approach this subject from different angles but the recommendations in this chapter, if passed on to the user, should result in a safe and intelligent operation of LP-Gas appliances and systems.

# TELL THE USER HOW!

**T**O those of us working daily in the LP-Gas business, it is difficult to realize that there are people who are not familiar with LP-Gas and its uses. What is a very simple thing to us may present quite a mystery to someone who has never used our fuel.

Besides a lack of knowledge, there are many instances when false information has been received through deliberate misrepresentations made by purveyors of competitive merchandise and fuels and through inaccurate press releases.

Individuals who have used natural or manufactured gas in the cities sometimes cannot understand why they receive fuel in a liquid form and burn it as gas. Many architects and engineers are not familiar with our fuel, its methods of delivery and use, and will often specify coal or fuel oil when LP-Gas should be used.

How can satisfactory information be placed in the hands of the users to increase our load and promote safety at the same time?

One approach is to the architects, builders and engineers who determine in many instances the type of fuel that eventually will be used in homes, commercial businesses and in institutions.

A successful operator solved this problem in a novel and simple way.

It was by preparing a simple brochure which was an assembly of advertising material of appliance manufacturers preceded by copy prepared to explain simply the availability, cost and safety of gas. Following are the contents:

1. A personal letter on the company stationery to the architect or builder explaining that the contents of the brochure were prepared for his handy reference and that costs could be obtained by direct inquiry and information on LP-Gas could be obtained free on request.

2. A picture of a good LP-Gas tank installation with a simple explanation of the method of filling, vaporization, pressure reduction and use of the fuel.

3. A table showing required distances of tanks of various sizes from the dwelling and the saving in fire insurance premiums gained by proper location of the tank.

4. A list of tank systems of various sizes, giving dimensions, weights, capacities and suggested maximum connected load for the various systems.

5. A page of information advising that the advertising material in the balance of the folder represented at least one model of appliance for each use especially designed and sold for LP-Gas for the large or small home and that commercial equipment for cooking, baking and heating was available.

Distribution of this material re-

## CONSUMER EDUCATION

sulted in a substantial increase in use in the area and a high standard of tank and appliance installation.

On the consumer level, education need be very simple but it should be accurate and easy to understand. When a new installation is made, the installer should be equipped to give the customer the following information:

1. Show the tank label and explain that the code stamping indicates the tank was designed, built and inspected under the rules established by the country's leading engineers and that it is designed to safely hold the fuel even in the hottest desert locations.

2. Show the safety valve and explain its purpose is to relieve the pressure on the tank in case of a grass or other nearby fire or if it should be overfilled by mistake.

3. Open the bleed valve and show the owner how liquid quickly evaporates into the gas form.

4. Explain how the regulator operates and how it holds a steady pressure of gas in the house piping.

5. Explain how the piping has been tested for leaks and found to be tight and safe at much higher pressure than the normal gas pressure.

6. Explain why it is desirable to keep weeds and rubbish away from the tank and regulator.

7. Explain that the hood over the valves is for protection from tampering by children and advise to keep it closed at all times with a lock.

8. Show how easily all gas can be shut off by merely closing one valve at the tank.

9. Show where the underground line goes from the tank to the house and how deep it is buried so it will not be damaged with garden tools.

10. Show the customer how to read the tank gauge so he will know be-

forehand if he is running short of fuel.

11. Have the customer light and put out all of the appliances that are installed and explain the proper method of lighting.

12. Explain the flame size and its high heat value, as many users are used to manufactured or natural gas flames which look different for the same amount of heat.

13. Explain how the gas is odorized and how a leak or open burner can be detected easily by smell.

14. Explain how gas that has escaped from an open burner or leak will tend to settle toward the floor and that the safe thing to do is to ventilate the room by opening windows and doors to the outside before striking a match or pushing an electric switch.

15. Impress upon the user to light the match *before* turning on the gas.

16. Explain the function of the thermostat on the water heater and the method of setting for hotter water when desired.

17. Explain how AGA approved appliances have been laboratory-tested for efficiency and safety.

18. Warn user against storing rags, mops or other combustible material in water heater or space heater rooms.

19. Explain the function of the air shutter on the burners and advise the user to keep the shutter opening clear of lint, grease or other foreign matter.

20. Take the top burners out of the range and explain how easy it is to keep the burners and air shutters clean. Most service calls come from poor housekeeping.

21. Explain the use of the oven and broiler thermostat.

# EMPLOYEE TRAINING

**E**MPLOYEES of all lines of business profit from training programs that help them to better perform their work.

In handling a product such as LP-Gas it is not only desirable to provide basic information regarding the product and methods of distribution, but from a safety standpoint, it is vital to tell every man all the facts he should know.

The accompanying recommendations will be helpful in accomplishing these several objectives:

**T**HE entire basis of training employees in safe practices rests on the fact that accidents are preventable. They do not happen; they are caused. An employee trained in safe practices, who works with safe equipment, and who is constantly aware that slipshod methods of workmanship may result in injury or loss of life will have an accident-free record.

An organization of men of this caliber will also have a spotless accident record.

To gain this excellent position, with its resultant benefits, takes time and effort on the part of both employer and employee. However, the employer cannot dodge the fact that the primary responsibility is his.

LP-Gas men, acknowledging

this, strive constantly to build up the "safety consciousness" of each of their employees. New employees receive thorough indoctrination in the right way to do their jobs. Older employees are given constant reminders of the value of keeping themselves and others off the accident layoff list.

The following list of methods and procedures used in developing that safety consciousness has been compiled from thorough reports made by a number of associations and companies which are vitally interested in making the industry's excellent safety record a better one. This is not the final or conclusive word on this subject—there is no end to the subject of properly trained employees to work safely.



## This could be your Servel sales force . . .

*if you had a salesmen's incentive plan!*

The above illustration might be taken from a Gas Refrigerator sales manager's fondest dreams. What better way to beat the buyers' market than with a creative-selling-minded sales force ringing doorbell after doorbell! You can make it a reality with the help of an incentive plan that rewards salesmen who make house calls pay off in Servel sales. This plan will make canvassing more attractive and stimulate healthy competition among your men.

### Have cards filled out on each prospect

Here's how you can work it. First, make sure your salesmen are equipped with survey cards that they can fill out on each prospect they find. Each card will contain space for name, address, current refrigerator data, date of call, etc. Printed cards have been found to be more satisfactory than blank cards. File these cards at your office at the end of each day's work.

Then when three sales, for example, are made to prospects for whom cards have been filed, the salesman who submitted the cards receives a cash bonus or a suitable gift. At the end of the month, the salesman

responsible for the most "card sales" receives a larger award. As an added inducement, keep progress reports on each man posted on your bulletin board. No salesman likes to see his name last on the list.

Require that every salesman who makes a sale call back on his customer within ten days of the Gas Refrigerator delivery. Aside from checking to see if everything is satisfactory, the salesman is in a good position to interest the customer in other gas appliances. What's more, he should "use the user" for new sales leads. For detailed information on this and other buyers' market selling plans, write to Servel, Inc., Evansville 20, Indiana.





## We're as close to you as your telephone.

The same telephone which brings you the answers to many problems can bring you a truly reliable source of butane and propane.

Athens Petroleum Corp. prides itself on the ever growing list of satisfied customers relying on our source of butane and propane. We offer a service that has never lost a customer. May we suggest that you contact us before you decide on your fuel supply.

**Athens**  
**PETROLEUM CORP.**  
McBirney Bldg. Phone 3-7133  
Tulsa, Okla.

## QUALIFYING EMPLOYEES

**F**IRST impressions are lasting. The time to start training a man in safety is during your first contact with him, before he starts working.

1. Make sure he knows the potentialities of the product he will be working with. All who handle LP-Gas should have a wholesome respect (as differentiated from fear) of the fuel. Only unknown quantities are feared.

2. Show him his tools, explaining each and how it should be used. This applies to wrenches as well as trucks.

3. See that he understands the company routine and knows who is responsible for every operation. Later, he will assume responsibility. See that he knows what it means.

4. Have him watch others and learn before he is given any job. Supervise his efforts until you are certain he knows what he is doing and why he is doing it. This last is most important.

5. Answer his questions explicitly as soon as he asks them. Anything referred to as "That's something you'll learn about later" becomes a hard-to-learn process in his mind.

6. Explain to him how his actions affect others beside himself.

7. His grasp of what you have told him and his general attitude should be judged fairly and thoroughly. You cannot teach, train, or take chances with a mental or social misfit.

### Older Employees

Some employers think it is possible to over-emphasize safety talk and safety programs. They think their men get tired of it and resent constant harping on the subject. When



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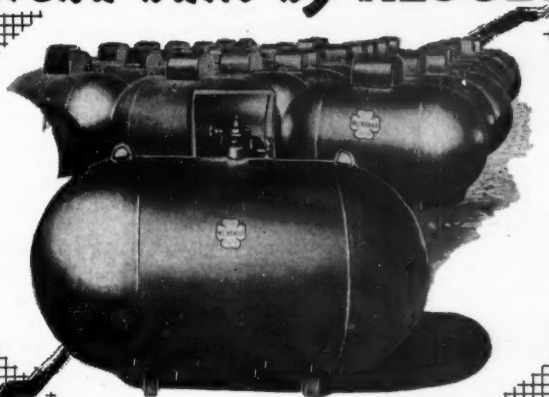
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*a trend built by* **RESULTS**



- ★ CONSUMER SYSTEMS
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## DEALERS GET MORE SALES *and satisfied customers* WITH McNAMAR LP-GAS SYSTEMS

*Check this list for YOUR 1949 Profit TREND:*

- ☐ McNamar gives you a big selection of quality-built systems—all sizes
- ☐ Two McNamar-plants of central location save you freight costs and time.
- ☐ Fast, low cost delivery by our own trucks for economy, or by rail.
- ☐ Modern plant manufacture with ASME code, Natl. Board Inspection, etc.

*Write Today!*  
**McNAMAR BOILER & TANK CO.**

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E. ST. LOUIS, ILL.  
Tel.: Est 2840

# 100% Safety

NEW

## MR-2-5 GAS COCK SAFETY VALVE



### SINGLE ROTARY ACTION FOR OPERATION OR RESET LIGHTING WITH GAS COCK IN "OFF" POSITION

**ALL-IN-ONE...** Combining automatic 100% safety shut-off with manual control valves for main burner and pilot.

**ONE HANDLE** controls main burner valve, pilot valve and manual safety reset. Handles for close or remote operation available.

**REDUCED COST** of installation with only one valve and one handle. For space and unit heaters, central and floor furnaces using natural, manufactured, mixed or liquefied petroleum gases.

Either Single Couple or Pilot Generator operated models available.

*For complete specifications request  
Brochure SDL-2R-4*

**GENERAL CONTROLS**  
301 ALLEN AVENUE GLENDALE 1, CALIF.  
*Manufacturers of Automatic Pressure,  
Temperature, Level & Flow Controls*

**Factory Branches:** Birmingham (3), Boston (16), Chicago (5), Cleveland (15), Dallas (2), Denver (10), Detroit (8), Glendale (1), Houston (6), Kansas City (2), New York (17), Oklahoma City (1), Philadelphia (40), Pittsburgh (22), Seattle (1), San Francisco (7), St. Louis (12) • **DISTRIBUTORS IN PRINCIPAL CITIES**

## EMPLOYEE TRAINING

a safety program is improperly presented, this is a problem. Keep your safety program clear of worthless fussing. Don't hold long, boring, aimless safety meetings. Make your speeches, posters, written material, and conferences clear, concise, and complete. The right attitude of presenting safety material makes every man realize that you are trying to keep him from losing an eye, an arm, or his life. It's an attitude with which he can sympathize.

Here are good methods of safety education:

**1. Signs around the plant.** See that every danger spot is marked properly. Don't put up so many signs that the effect is lost.

**2. Install a plant bulletin board.** Use it. Put up items of information which are of interest to the men so that the board will be read. Then see that your safety messages are also given good display and are of interest. Cartoons with a safety theme are good eye-catchers.

The bulletin board is also the place for the plant safety record. Watch out that your accident-frequency chart isn't just a group of dry figures. See that it carries the message that each blemish on the chart means that a man has been injured, and that the next mark on the chart might represent the man who is reading the bulletin board.

**3. Safety contests.** To make a good safety record even more desirable, use the spirit of competition that we all possess to promote safe practices. Monetary rewards are good, picnics or parties for winning departments (with the boss picking up the tab) are even better.

**4. Cash awards.** Use these to promote suggestions from employees. Figure out how much you can spend on this kind of safety promotion, and figure high. Remember, your

# bare facts



- Bear with us for a moment. If you buy L-P Gas you'll find it profitable.
- Sid Richardson Gasoline Co. has an attractive purchase plan for you in which you assist in establishing your own gas costs.
- Combine this with friendly, helpful service and you'll have the *bare facts* on why it's both profitable and pleasant to do business with Sid Richardson Gasoline Co.
- An inquiry will bring you all of the interesting facts.

## **Sid Richardson** GASOLINE CO.

629 FORT WORTH CLUB BUILDING • FORT WORTH, TEXAS

# Superseal

## Gas Appliance Connectors



**1**  
Connect Superseal  
fitting to range



**2**  
Connect tubing  
to fitting



**3**  
Make connection  
to wall outlet



**4**  
Push range  
into position



**QUICK, EASY, COMPACT** ... neat, flush-to-wall installations every time—that's the Superseal Connector way. These complete assemblies of .049" wall aluminum or brass tubing and heavy hex malleable iron fittings are available in any combination of elbows, straight fittings or shut-off valves, as required. Connectors are approved by Underwriters' Laboratories.

**COLUMBIA MALLEABLE  
CASTINGS CORP.**

SUPERSEAL CONNECTOR DIVISION  
COLUMBIA, PA.

## EMPLOYEE TRAINING

investment is your life in more ways than one.

**5. Plant publications.** Large operators often have plant newspapers or magazines; smaller firms can at least have a weekly, mimeographed bulletin. See that the news pertaining to safety is well displayed and interestingly written. Personalize the writing and the subject. Announce safety contest winners and publicize money awards for safety suggestions.

**6. Technical training.** Any workman worth his wages will jump at the chance to learn more about his job. Search for material which will give him that chance and see that it is distributed. Incidentally, beware of workmen who think they know their jobs perfectly. Learning is a continuous process in any field.

**7. Safety meetings.** If you hold them regularly, as you should, make certain that you have new material to present at each meeting, or at least present older material in a new manner. Use all the movies, slides, and recordings you can get, and you can get plenty by looking for them. Intersperse them with pure entertainment features whenever possible. Proper presentation can make men look forward to the regular safety program.

**8. Speeches, either at safety meetings or when occasion arises.** Don't talk for the sake of making the meeting a certain length of time. Whenever you speak, present the material you have surely and entertainingly and then close without rambling. Be sure that the physical setup in the place doesn't disconcert your audience. Don't talk in front of a map or a chart or in a place where it is difficult to see or hear you.

**9. Speech material.** When you use a chart, bring it out as you make your point. Don't let it stand up in

# HERE ARE YOUR ANSWERS

## PARTIAL LIST OF CONTENTS

WHAT IS PROPANE? — Supply. Properties. Definitions.

THE BEHAVIOR OF GASES — Pressure. Specific Gravity. Density. Compression.

HEAT AND TEMPERATURE — Heat Transfer. Conduction. Convection. Radiation. Expansion.

WHAT GOES ON IN A PROPANE CYLINDER. — Construction. Filling.

THE SIMPLE REGULATOR — Design Problems and Cures.

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GAS LIGHTING — Law Governing Transmission of Light. Relative Costs. Value to Industry.

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LOS ANGELES 14,  
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**MODERN HEATMAKER**  
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*The* **OHIO FOUNDRY & MANUFACTURING CO.**  
*Engineers • Manufacturers • Designers*  
 STURENSVILLE • OHIO • U.S.A.

**EMPLOYEE TRAINING**

front beside you so the audience can see and read it while you're talking about something else. Pamphlets that cover your subject should be handed out after you speak, not before. Make sure your audience has its attention focused on you, and then make doubly sure that what you say deserves this attention.

**10. Safety committees.** Have your employees form a safety committee (or committees, in a large organization) to help the administration of your safety program. This committee should have as one of its primary functions the investigating of accidents that do occur. Let this employee committee judge where responsibility for the accident lies and make recommendations how to prevent a recurrence. Give your men responsibility. If you have hired and trained them well you will benefit by the interest they take in saving you and themselves trouble, time, and money.

**The Employer**

The best training you can give your men is to show them you are vitally interested in preventing injuries and damage. Supervise dangerous work yourself. New processes, new methods, new tools—anything out of the ordinary—call for you to be on the spot to direct operations.

Keep a regular inspection schedule on all equipment and methods used. You may not be adept at all the jobs in your organization, but you should be able to spot bad or sloppy workmanship and see that it isn't repeated.

Check up on "no injury" accidents just as thoroughly as those which result in injury. Next time it could be different.

When it comes to safety, men follow the examples of their leaders. Be a good example!

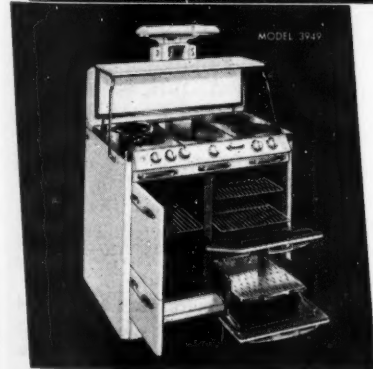
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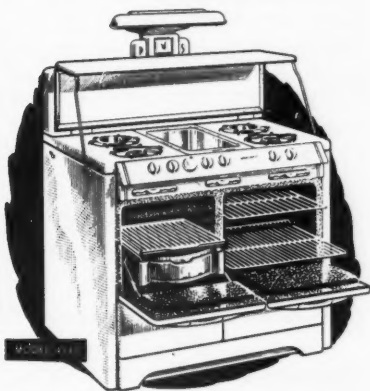
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# *Here's Variety*

at your customer's price!

NOW TWELVE  
**O'KEEFE & MERRITT**  
*Gas Ranges*  
FROM WHICH TO CHOOSE!



Every prospect is a sure sale with O'Keefe & Merritt's extensive line! 12 models—size-scaled, price-ranged to meet every budget, every need.

Many more models—built to standards that women recognize for carefree cooking—that you'll recognize as sure sales builders!

For complete details on all models write  
**O'KEEFE & MERRITT CO.**  
3700 E. Olympic Blvd., Los Angeles 23, Cal.

# GOOD RULES FOR TRAILER COACHES

**D**UE to the many manufactures of trailers and a complete lack of standardization of LP-Gas equipment, the delivery problem to this type of customer has raised serious problems to the industry.

In an effort to remedy this situation, the Liquefied Petroleum Gas Assn. has prepared a proposed trailer code to be offered as an addition to NBFU Pamphlet No. 58 and to be known as Division VI of that pamphlet. There has not yet been time for action upon these

recommendations by the NFPA and the NBFU.

The LPGA proposed code follows:

## Cylinder Systems for Cooking and Heating Installations on Highway Mobile Vehicles

Division VI applies specifically to systems using LP-Gas on mobile vehicles and other highway mobile vehicles. All basic rules apply to Division VI unless otherwise noted in this division or in the basic rules.

Division VI does not apply to cargo carrying vehicles.

Where liquefied petroleum gas is supplied to a permanently parked vehicle from a system not mounted on and secured to the unit, Division I or II shall apply.

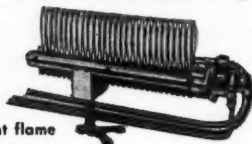
### 6.1 Construction of Containers

(a) Containers shall be constructed in accordance with the specifications of the Interstate Commerce Commission. Cylinders fabricated and marked prior to July 1, 1949, according to the requirements of the ASME or the API-ASME Unfired Pressure Vessel Code shall be acceptable provided they comply with all other requirements set forth in this Division.

### 6.2 Marking of Containers and Capacity

(a) All containers shall be marked in accordance with the Interstate Commerce Commission regulations.

**A GREAT NEW LP ITEM**  
*Kitchen Heating*  
**RANGE CONVERSION BURNER**  
with  
*Automatic Heat Control*  
for  
**Bungalow or Combination Ranges**



- Radiant flame
- Burns all gases
- Easily installed
- Replaces coal or oil in existing ranges

25M BTU  
INPUT

Dealers: good territories available

**HEATBATH APPLIANCES, INC.**  
SPRINGFIELD, MASS.



# ROADMASTER

Gives You

"Controlled Pressure"\*



\* The NEW Roadmaster LP-Gas Carburetion equipment is different from other types now available. Its new principle supplies vapor fuel to engine at "controlled pressure above atmospheric." When this is done, starting, idle, cruising and load operating conditions are easily met by employing a simple metering control such as venturi and fuel orifice . . . proper air fuel ratios are obtained over entire operating range . . . Performance is greatly improved. For complete information on this advanced equipment, write:

## FEATURES:

- New electric fuel valve gives positive shut-off.
- New Vaporizer - Regulator discharges at controlled pressure . . . not sub-atmospheric.
- Simple Carburetor Adapter is venturi type . . . employs one fuel load adjustment; fits standard air horn.

## ROADMASTER PRODUCTS CO.

3350 San Fernando Road

Los Angeles, Calif.

## The Power Load

IS WORTH DEVELOPING

- For Balanced Fuel Sales
- For New Fuel Outlets

There Is  Equipment for Every Engine

**AMERICAN LIQUID GAS CORP.** 1109 S. Santa Fe, Los Angeles, Calif.

JUNE — 1949

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## **Liquefied Petroleum Gas**

### **Cities Service Oil Co.**

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A DEPENDABLE SOURCE  
UNIFORM PRODUCTS  
A CAPABLE SUPPLIER  
TWENTY YEARS' EXPERIENCE

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### **IN LP GAS ALSO**

CITIES SERVICE  
MEANS  
GOOD SERVICE

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### **CITIES SERVICE OIL CO. (Del.)**

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BARTLESVILLE, OKLA.  
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## **TRAILERS**

Additional markings not in conflict with Interstate Commerce Commission regulations may be used.

### **6.3 Description of a Division VI System**

(a) A Division VI system shall include: a housing; a bracket or support for supporting and mounting the containers; containers; container valves; manifold valve assembly (two-cylinder systems); regulator and relief valves.

### **6.4 Location of Containers and Regulating Equipment**

(a) No container shall be installed, transported, or stored (even temporarily) inside any vehicle covered by Division VI.

(b) Containers, control valves, and regulating equipment enclosed in a housing, and comprising a complete system shall be mounted:

(1) On the chassis of the vehicle as close to the hitch as practicable, or

(2) In a recess gas tight to the inside of the mobile unit and only accessible and vented from the outside.

### **6.5 Container Valves and Accessories**

(a) Valves in the assembly of a two-cylinder system shall be arranged so that replacement of containers can be made without shutting off the flow of gas to the appliances.

Note: This provision is not to be construed as requiring an automatic changeover device.

(b) Shutoff valves on the containers shall be protected while in transit, in storage, and while being moved into final utilization as follows:

**Don't TRUST TO LUCK...**

You never get the short end when you specify safe, dependable L-P Gas Equipment from our conveniently located warehouses.

*Play Safe-*

**Aeroquip**  
INDUSTRIAL HOSE LINES

**BRUNNER**  
TANK UNLOADING  
UNITS

**ALL FINE**  
PRODUCTS

**REGO**  
LAP  
GAS

**I.C.C. CYLINDERS**

**GAS EQUIPMENT COMPANY, Inc.**

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Standard Rates Apply to U. S. & Possessions, Canada, Mexico, Cuba, South and Central American Countries.

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JUNE — 1949

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Save time, save money with  
another new Mutual product—

## Mutual CYLINDER VISE



*Specially  
developed  
for valving  
L.P. Gas  
cylinders  
quickly,  
efficiently,  
econom-  
ically!*

This versatile, adjustable Mutual Cylinder Vise saves you many hours by holding cylinders securely during valving operations. Accommodates long or short cylinders from 10 in. to 15 in. in diameter. All steel construction. Height, 40 in.; width, 18½ in.; weight, 48 lbs. Order today. (Patent pending.)

NOTE: When ordering, please specify size of cylinders to be handled.

FREE! Write today for Mutual's colorful new 1949 Catalog hot off the press!



**Mutual**  
LIQUID GAS EQUIPMENT CO., Inc.

3600 W. Imperial Highway, Inglewood, Calif.

(1) By setting into recess of container to prevent possibility of their being struck if container is dropped upon a flat surface, or

(2) By ventilated cap or collar fastened to container capable of withstanding a blow from any direction equivalent to that of a 30-lb. weight dropped 4 ft. Construction must be such that a blow will not be transmitted to valve.

### 6.6 Safety Devices

(a) ICC containers shall be provided with safety relief devices as required by the Regulations of the Interstate Commerce Commission.

(b) Containers constructed in accordance with the rules of the ASME or the API-ASME shall be provided with safety relief devices as required by B.9 hereof.

(c) The low pressure side of gas pressure regulators shall be equipped with a safety device set to start to discharge at a pressure not over 1 psi.

### 6.7 System Design and Service Line Pressure

(a) Systems shall be of the vapor withdrawal type.

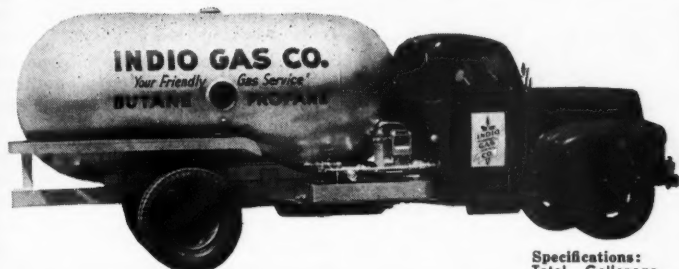
(b) Systems supplying fuel to appliances in the liquid or in the liquid-gaseous phase are prohibited.

(c) Vapor, at a pressure not over 18-in. watercolumn shall be delivered from the system into the service piping supplying the appliances.

### 6.8 System Enclosure and Mounting

(a) Housings or enclosures shall be designed to provide proper ventilation.

(b) Hoods, domes, or portions of cabinets required to be removed from replacement of containers shall in-



## Do You Need A Tank Truck?

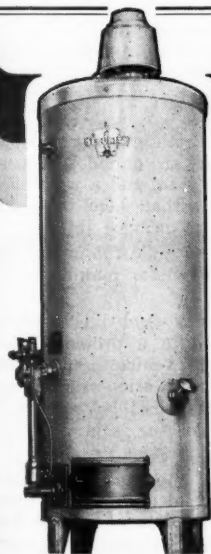
Here is one we just finished for Indio Gas Co., Indio, Calif. They needed a big unit for large deliveries, over flat desert country, to customers with large storage tanks. We made it light... with maximum capacity, according to their needs.

*This type of service is our specialty . . .  
Let us figure a job for you.*

### Superior Tank & Construction Co.

Specifications:  
Total Gallonage . . .  
1505 net propane.  
Dimensions:  
Diameter . . . 66 1/2 in.  
Length . . . 12 ft. 9 in.  
Working pressure . . .  
250 lbs.  
Fabricated of light  
weight, hi-tensile steel  
throughout. Tank is X-  
rayed and stress re-  
lieved.

6155 So. Eastern  
Los Angeles, Calif.



## Outstanding Quality...Styling...Value

Greater grows the demand for SECURITY Automatic Hot Water Heaters. More and more buyers seek the smart appearance, dependable performance, superior workmanship for which SECURITY is famed. Thousands of users are amazed at the efficiency, economy and long life of these gleaming Automatic Water Heaters. Operate on all fuel gases. Now is the time to look to SECURITY . . . for leadership and for sales!

## SECURITY

GAS FIRED  PRODUCTS

The "LONG-LIFE" LINE

SECURITY MANUFACTURING CO.  
KANSAS CITY 3, MO.



Traffic Officials Everywhere, Major Industries—all of us—are vitally interested in American Life and Prosperity. All are

## **URGING SAFETY**

Certainly, the continuing life and progress of the Liquefied Petroleum Gas distribution business very largely depends on the

## **UTMOST OF SAFETY**

in every phase of its operations. A fundamental understanding of the product, its proper and safe handling, correct and safe installation and servicing of pertinent equipment and appliances.

## **ALL THESE ARE STRESSED**

in our training courses. We have helped many LP-Gas operators and their employees—**WE CAN HELP YOU.** Just fill out and mail the coupon below to us, **NOW!**

Send information on ( ) 30-Day, ( ) 4-months Resident, ( ) Home Study Course, or men available for ( ) Installation ( ) Service ( ) Sales Work.

Name.....

Address.....

City.....State.....

**NATIONAL L-P GAS INSTITUTE**  
1105 S. Main, TULSA, OKLA., Tel. 3-5076

## **TRAILERS**

corporate means for clamping them firmly in place, and prevent them from working loose during transit.

(c) Provision shall be incorporated in the assembly to hold the containers firmly in position and prevent their movement during transit.

(d) Containers shall be mounted on a substantial support or base secured firmly to the vehicle chassis.

(e) When the container support is used inside the frame members, the maximum depth shall not exceed 7 in. from the top of the chassis to provide sufficient road clearance.

### **6.9 Piping and Fittings**

(a) Regulators shall be lightweight construction and connected directly to the cylinder valve inlet, or mounted securely by means of a support bracket and connected to the cylinder valve or valves with an approved high pressure flexible connection.

(b) An expansion loop in the gas service piping or an approved flexible connection between the regulator outlet and the gas service piping, shall be used.

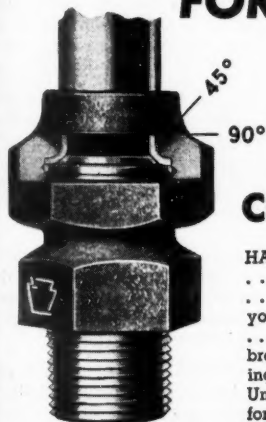
(c) Only seamless drawn copper tubing having an outside diameter not less than  $\frac{3}{8}$  in. and a wall thickness of not less than 0.032 inch, shall be used for gas service lines.

(d) Approved gas tubing fittings shall be employed for making tubing connections.

(e) The vapor fuel line shall be firmly fastened in a protected location under the vehicle and outside and below any insulation or false bottom. Fastenings shall be such as to prevent abrasion or injury to the tubing from vibration.

(f) The gas line shall be installed to enter the vehicle through rubber grommets or equivalent in the floor directly beneath the appliance which

**FOR ADDED SAFETY...**



## **Double Seal Copper Tube Fittings**

### **HAYS DOUBLE SEAL FITTINGS**

... seating at both 45° and 90°  
... the safest possible fittings  
you can use ... vibration-proof  
... twist-proof ... leak-proof ...  
brass castings—no season crack-  
ing ... tested and approved by  
Underwriters' Laboratories. Write  
for folder 101, giving complete  
information.



**HAYS MANUFACTURING CO., ERIE, PA.**

# *Butane & Propane*

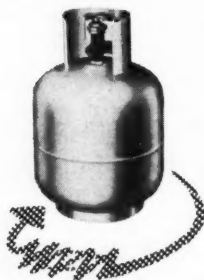
## **E**

**Producers of high quality  
Liquefied Petroleum Gases Since 1931  
Wholesale Only**

**THE CARTER OIL COMPANY**  
**T U L S A , O K L A H O M A**

**New CGC**  
**20 pounder**

- **LIGHTER**
- **STRONGER**
- **LOWEST PRICE**



**DESIGNED FOR SAFETY  
BUILT FOR SERVICE**

NOW! A superior quality 5-gallon propane capacity cylinder by CGC. Built to ICC 4B240 specifications. X-Ray controlled welding. Available with permanent guard or removable cap. Write us for complete information.



**COMPRESSED GAS CYLINDERS, INC.**

2909 East 54th Street  
Los Angeles, California

**TRAILERS**

(c) Appliances shall be located inside a vehicle so that a fire at an appliance will not block all egress of persons from the vehicle.

**6.11 General Precaution**

(a) Containers shall be marked, maintained and retested in accordance with the Regulations of the Interstate Commerce Commission, (See Section 6.1).

(b) Retests shall be made with properly approved equipment, and the containers shall be stamped with the date of retest. This is the responsibility of the owner of containers.

(c) No container shall be charged with fuel unless it bears the proper markings of the code under which it is fabricated, and in addition with the water capacity and the tare weight of the container.

(d) Containers shall be filled only at properly equipped bulk plants and filled only by weight. No container shall be filled without consent of the owner thereof.

(e) No container shall be refilled which has been damaged or involved in a fire until it has been requalified for service according to ICC regulations.

(f) A permanent caution plate shall be provided on the outside of the system enclosure and adjacent to the consuming appliances. It shall include the following items:

**Warning—Before Turning on Gas at Container—**

1. Be sure all appliance valves are closed before opening container valves.
2. If vehicle has been in transit, open cylinder valves and immediately check all connections for leaks with soapy water or its equivalent.
3. Never use a match or flame when checking for leaks.
4. Cylinder valves must be closed when vehicle is in transit.